

CHAPTER 43
WATER SUPPLIES — DESIGN AND OPERATION

[Prior to 12/12/90, portions of this chapter appeared in 567—Ch 41]

567—43.1(455B) General information.

43.1(1) *Emergency actions regarding water supplies.* When, in the opinion of the director, an actual or imminent hazard exists, the supplier of water shall comply with the directives or orders of the director necessary to eliminate or minimize that hazard.

43.1(2) *Prohibition on the use of lead pipes, solder and flux.* Any pipe, solder or flux which is used in the installation or repair of any public water supply system or any plumbing in a residential or non-residential facility providing water for human consumption which is connected to a public water supply system shall be lead-free as defined in 567—40.2(455B). This action shall not apply to leaded joints necessary for the repair of cast iron pipe.

43.1(3) *Use of noncentralized treatment devices.*

a. Community PWS. Community public water systems shall not use bottled water, point-of-use (POU) or point-of-entry (POE) devices to achieve permanent compliance with a maximum contaminant level, action level, or treatment technique requirement in 567—Chapters 41 and 43.

b. Noncommunity PWS. Noncommunity public water supply systems may be allowed by the department to use point-of-use devices to achieve MCL compliance provided the contaminant does not pose an imminent threat to health (such as bacteria) nor place a sensitive population at risk (such as infants for nitrate or nitrite).

c. Reduced monitoring requirements. Bottled water, point-of-use, or point-of-entry devices cannot be used to avoid the monitoring requirements of 567—Chapters 41 and 43, but the department may allow reduced monitoring requirements in specific instances.

d. Bottled water requirements. The department may require a public water system exceeding a maximum contaminant level, action level, or treatment technique requirement specified in 567—Chapters 41 and 43 to use bottled water as a condition of an interim compliance schedule or as a temporary measure to avoid an unreasonable risk to health. Any bottled water must, at a minimum, meet the federal Food and Drug Administration bottled water standards, listed in the Code of Federal Regulations, Title 21, Chapter 165.110. The system must meet the following requirements:

(1) Monitoring program. Submit for approval to the department a monitoring program for bottled water. The monitoring program must provide reasonable assurances that the bottled water complies with all maximum contaminant levels, action levels, or treatment technique requirements in 567—Chapters 41 and 43. The public water system must monitor a representative sample of bottled water for all contaminants regulated under 567—Chapters 41 and 43 the first quarter that it supplies the bottled water to the public, and annually thereafter. Results of the monitoring program shall be provided to the department annually.

(2) Certification and monitoring requirements. The public water system must receive a certification from the bottled water company that the bottled water supplied has been taken from an “approved source”; the bottled water company has conducted monitoring in accordance with 43.1(3) “*b*”(1); and the bottled water meets MCLs, action levels, or treatment technique requirements as set out in 567—Chapters 41 and 43. The public water system shall provide the certification to the department the first quarter after it supplies bottled water and annually thereafter.

(3) Provision of bottled water to consumers. The public water supply system is fully responsible for the provision of sufficient quantities of bottled water to every person supplied by the public water system via door-to-door bottled water delivery.

e. Point-of-use devices. Reserved.

f. Point-of-entry devices. Reserved.

43.1(4) Cross-connection control. To prevent backflow or backsiphonage of contaminants into a public water supply, connection shall not be permitted between a public water supply and any other system which does not meet the monitoring and drinking water standards required by this chapter except as provided below in “a” or “b.”

a. Piping and plumbing systems. Piping systems or plumbing equipment carrying nonpotable water, contaminated water, stagnant water, liquids, mixtures or waste mixtures shall not be connected to a public water supply unless properly equipped with an antisiphon device or backflow preventer acceptable to the department.

b. Bulk water loading stations. Positive separation shall be provided through the use of an air gap separation or a backflow preventer, which is acceptable to the department, at all loading stations for bulk transport tanks.

(1) Minimum air gap. The minimum required air gap shall be twice the diameter of the discharge pipe.

(2) Backflow preventer criteria. An approved backflow preventer for this application shall be a reduced pressure backflow preventer or an antisiphon device which complies with the standards of the American Water Works Association and has been approved by the Foundation for Cross-Connection Control and Hydraulic Research, University of Southern California.

When, in the opinion of the department, evidence clearly indicates the source of contamination within the system is the result of a cross-connection, the department may require a public water supply to identify and eliminate the connection, and implement a systemwide cross-connection program.

43.1(5) Requirement for certified operator.

a. CWS and NTNC systems. All community and nontransient noncommunity public water supply systems must have a certified operator in direct responsible charge of the treatment and distribution systems, in accordance with 567—Chapters 40 through 44 and 81.

b. TNC systems. Any transient noncommunity public water supply system which is owned by the state or federal government, such as a state park, state hospital, or interstate rest stop, or is using a groundwater under the direct influence of surface water or surface water source, must have a certified operator in direct responsible charge of the treatment and distribution systems, in accordance with 567—Chapters 40 through 44 and 81. Any TNC which uses chlorine dioxide as a disinfectant or oxidant must have a certified operator in direct responsible charge of the system, pursuant to 567—Chapter 81. The department may require any TNC to have a certified operator in direct responsible charge.

567—43.2(455B) Permit to operate.

43.2(1) Operation fees.

a. Annual fee. A fee for the operation of a public water supply system shall be paid annually. The fee will not be prorated and is nonrefundable. The fee shall be based on the population served. The fee shall be the greater of \$25 per year or \$0.14 multiplied by the total population served by the public water supply for all community and nontransient noncommunity public water supply systems. The fee shall be \$25 per year for all transient noncommunity water systems. Where a system provides water to another public water supply system (consecutive public water supply system) which is required to have an operation permit, the population of the recipient water supply shall not be counted as a part of the water system providing the water.

b. Fee notices. The department will send annual notices to public water supply systems at least 60 days prior to the date that the operation fee is due.

c. Fee payments. The annual operation fee must be paid to the department by September 1 each year.

d. Fee schedule adjustment. The department may adjust the per capita fee payment by up to +/- \$0.02 per person served so as to achieve the targeted revenue of \$350,000 during each fiscal year. The environmental protection commission must approve any per capita fee rate above \$0.14 per person. The extent of the fee adjustment must comply with Iowa Code section 455B.183A.

e. Exempted public water supply systems. Public water supply systems located on Indian lands are exempt from the fee requirements.

f. Late fees. When the owner of a public water supply fails to make timely application or to remit payment of fees by September 1, the department will notify the system by a single notice of violation. In addition, a late fee of \$100 will be assessed for failure to remit the operation fee by September 1. The department may thereafter issue an administrative order pursuant to Iowa Code section 455B.175(1) or request a referral to the attorney general under Iowa Code section 455B.175(3) as necessary.

43.2(2) Operation permit requirement. Except as provided in 43.2(3) and 43.2(4), no person shall operate any public water supply system or part thereof without, or contrary to any condition of, an operation permit issued by the director.

43.2(3) Application for operation permit. The owner of any public water supply system or part thereof must make application for an operation permit. No such system shall be operated without an operation permit, unless proper application has been made. Upon submission of a completed application form, the time requirement for having a valid operation permit is automatically extended until the application has either been approved or disapproved by the director.

43.2(4) Operation permit application form issuance.

a. Operation permit application form. Application for operation permits shall be made on forms provided by the department. The application for an operation permit shall be filed at least 90 days prior to the date operation is scheduled to begin unless a shorter time is approved by the director. The director shall issue or deny operation permits for facilities within 60 days of receipt of a completed application, unless a longer period is required and the applicant is so notified. The director may require the submission of additional information deemed necessary to evaluate the application. If the application is incomplete or otherwise deficient, processing of the application shall not be completed until such time as the applicant has supplied the missing information or otherwise corrected the deficiency.

b. Identity of signatories of operation permit applications. The person who signs the application for an operation permit shall be:

(1) Corporation. In the case of a corporation, a principal executive officer of at least the level of vice president. The corporation has the option of appointing a designated signatory to satisfy this requirement.

(2) Partnership. In the case of a partnership, a general partner.

(3) Sole proprietorship. In the case of a sole proprietorship, the proprietor.

(4) Public facility. In the case of a municipal, state or other public facility, by either the principal executive officer or the ranking elected official.

c. Appeal. The denial of a permit, or any permit condition, may be appealed by the applicant to the environmental protection commission pursuant to 567—Chapter 7.

43.2(5) Operation permit conditions.

a. Operation permit conditions. Operation permits may contain such conditions as are deemed necessary by the director to ensure compliance with all applicable rules of the department, to ensure that the public water supply system is properly operated and maintained, to ensure that potential hazards to the water consumer are eliminated promptly, and to ensure that the requirements of the Safe Drinking Water Act are met.

b. Compliance schedule. Where one or more maximum contaminant levels, treatment techniques, designated health advisories, or action levels cannot be met immediately, a compliance schedule for achieving compliance with standards may be made a condition of the permit. A compliance schedule requiring alterations in accordance with the standards for construction in 43.3(1) and 43.3(2) may also be included for any supply that, in the opinion of the director, contains a potential hazard.

c. Treatment. If the department determines that a treatment method identified in 43.3(10) is technically feasible, the department may require the system to install or use that treatment method in connection with a compliance schedule issued under the provisions of 43.2(5)“*b.*” The department’s determination shall be based upon studies by the system and other relevant information.

43.2(6) Notification of change in operation permit application conditions. The owner of a public water supply system shall notify the director within 30 days of any change in conditions identified in the permit application. This notice does not relieve the owner of the responsibility to obtain a construction permit as required by 43.3(455B).

43.2(7) Renewal of operation permits. The department may issue operation permits for durations of up to five years. Operation permits must be renewed prior to expiration in order to remain valid. The renewal date shall be specified in the permit or in any renewal. Application for renewal must be received by the director, or postmarked, 60 days prior to the renewal date, on forms provided by the department.

43.2(8) Denial, modification, or suspension of operation permit. The director may deny renewal of, modify, or suspend, in whole or in part, any operation permit for good cause. Denial of a new permit, renewal of an existing permit, or modification of a permit, may be appealed to the environmental protection commission pursuant to 567—Chapter 7. Suspension or revocation may occur after hearing, pursuant to 567—Chapter 7. Good cause includes the following:

- a.* Violation of any term or condition of the permit.
- b.* Obtaining a permit by misrepresentation of fact or failure to disclose fully all material facts.
- c.* A change in any condition that requires either a permanent or temporary modification of a permit condition.
- d.* Failure to submit such records and information as the director may require both generally and as a condition of the operation permit in order to ensure compliance with conditions specified in the permit.
- e.* Violation of any of the requirements contained in 567—Chapters 40 to 43.
- f.* Inability of a system to either achieve or maintain technical, managerial, or financial viability, as determined in rule 567—43.8(455B).

567—43.3(455B) Public water supply system construction.

43.3(1) Standards for public water supplies. Any public water supply that does not meet the drinking water standards contained in 567—Chapters 41 and 43 shall make the alterations in accordance with the standards for construction contained in 43.3(2) necessary to comply with the drinking water standards unless the public water supply has been granted a variance from a maximum contaminant level or treatment technique as a provision of its operation permit pursuant to 43.2(455B), provided that the public water supply meets the schedule established pursuant to 43.2(455B). Any public water supply that, in the opinion of the director, contains a potential hazard shall make the alterations in accordance with the standards for construction contained in this rule necessary to eliminate or minimize that hazard.

43.3(2) Standards for construction.

a. The standards for a project are the Ten States Standards and the American Water Works Association (AWWA) Standards as adopted through 1998 and 43.3(7) to 43.3(9). Polyvinyl chloride (PVC) pipe manufactured in accordance with ASTM D2241 or ASTM F1483 may also be used in Iowa. To the extent of any conflict between the Ten States Standards and the American Water Works Association Standards and 43.3(7) to 43.3(9), the Ten States Standards, 43.3(2), and 43.3(7) to 43.3(9) shall prevail. The maximum allowable pressure for PVC or polyethylene (PE) pipe shall be determined based on a safety factor of 2.5 and a surge allowance of no less than two feet per second (2 fps).

b. Variance. When engineering justification satisfactory to the director is provided substantially demonstrating that variation from the design standards will result in equivalent or improved effectiveness, such a variation from design standards may be accepted by the director. A variance denial may be appealed to the environmental protection commission pursuant to 567—Chapter 7. Variance requests for projects qualifying for a waiver from the engineering requirement of 43.3(4) may be made without the retained services of a professional engineer.

43.3(3) Construction permits. No person shall construct, install or modify any project without first obtaining, or contrary to any condition of, a construction permit issued by the director or by a local public works department authorized to issue permits under 567—Chapter 9 except as provided in 43.3(3) “b,” 43.3(4) and 43.3(6). Construction permits are not required for point-of-use treatment devices installed by a noncommunity water system except those devices required by the department to meet a drinking water standard pursuant to 567—Chapters 41 and 43. No construction permit will be issued for a new public water supply system without a completed viability assessment, which has been approved by the department, and demonstrates that the system is viable, pursuant to 43.8(455B).

a. *Construction permit issuance conditions.* A permit to construct shall be issued by the director if the director concludes from the application and specifications submitted pursuant to 43.3(4) “b” and 567—40.4(455B) that the project will comply with the rules of the department.

b. *Construction permit application.* Application for any project shall be submitted to the department at least 30 days prior to the proposed date for commencing construction or awarding of contracts. This requirement may be waived when it is determined by the department that an imminent health hazard exists to the consumers of a public water supply. Under this waiver, construction, installation, or modification may be allowed by the department prior to review and issuance of a permit if all the following conditions are met:

- (1) The construction, installation or modification will alleviate the health hazard;
- (2) The construction is done in accordance with the standards for construction pursuant to 43.3(2);
- (3) Plans and specifications are submitted within 30 days after construction;
- (4) An engineer, registered in the state of Iowa, supervises the construction; and
- (5) The supplier of water receives approval of this waiver prior to any construction, installation, or modification.

43.3(4) Waiver from engineering requirements. The requirement for plans and specifications prepared by a registered engineer may be waived for the following types of projects, provided the improvement complies with the standards for construction. This waiver does not relieve the supplier of water from meeting the application and permit requirements pursuant to 43.3(3), except that the applicant need not obtain a written permit prior to installing the equipment.

a. Simple chemical feed, if all the following conditions are met:

(1) The improvement consists only of a simple chemical solution application or installation, which in no way affects the performance of a larger treatment process, or is included as part of a larger treatment project;

(2) The chemical application is by a positive displacement pump (of the piston type with a sole-noid operated diaphragm), the acceptability of said pump to be determined by the department;

(3) The supplier of water provides the department with a schematic of the installation and manufacturer’s specifications sufficient enough to determine if the simple chemical feed installation meets, where applicable, standards for construction pursuant to 43.3(2);

(4) The final installation is approved based on an on-site review and inspection by department staff; and

(5) The installation includes only the prepackaged delivery of chemicals (from sacks, containers, or carboys) and does not include the bulk storage or transfer of chemicals (from a delivery vehicle).

b. Self-contained treatment unit, if all the following conditions are met:

(1) The installation is proposed for the purpose of eliminating a maximum contaminant level violation and is of a type which can be purchased “off the shelf,” is self-contained requiring only a piping hookup for installation and operates throughout a range of 35 to 80 pounds per square inch;

- (2) The plant is designed to serve no more than an average of 250 individuals per day;
- (3) The department receives adequate information from the supplier of water on the type of treatment unit, such as manufacturer's specifications, a schematic indicating the installation's location within the system and any other information necessary for review by the department to determine if the installation will alleviate the maximum contaminant level violation; and
- (4) The final installation is approved based on an on-site inspection by department staff.

43.3(5) *Project planning and basis of design.* An engineering report containing information and data necessary to determine the conformance of the project to the standards for construction and operation in 43.3(2) and the adequacy of the project to supply water in sufficient quantity and at sufficient pressure and of a quality that complies with drinking water standards pursuant to 567—Chapters 41 and 43 must be submitted to the department either with the project or in advance.

a. Such information and data must supply pertinent information as set forth in part one of the Ten States Standards.

b. The department may reject receipt or delay review of the plans and specifications until an adequate basis of design is received.

43.3(6) *Standard specifications for water main construction.* Standard specifications for water main construction by an entity may be submitted to the department or an authorized local public works department for approval. Such approval shall apply to all future water main construction by or for that entity for which plans are submitted with a statement requiring construction in accordance with all applicable approved standard specifications unless the standards for public water supply systems specified in 43.3(2) are modified subsequent to such approval and the standard specifications would not be approvable under the modified standards. In those cases where such approved specifications are on file, construction may commence 30 days following receipt of such plans by the department or an authorized local public works department if no response has been received indicating construction shall not commence until a permit is issued.

43.3(7) *Proposed raw or finished water site approval.*

a. Approval required. The site for each proposed raw water supply source or finished water below-ground level storage facility must be approved by the department prior to the submission of plans and specifications.

b. Criteria for approval. A site may be approved by the director if the director concludes that the criteria in this paragraph are met.

(1) Groundwater source. A well site must be separated from sources of contamination by at least the distances specified in Table A.*

Drainage must be away from the well in all directions for a minimum radius of 15 feet.

After the well site has received preliminary approval from the department, the owner of the proposed public well shall submit proof of legal control of contiguous land, through purchase, lease, easement, ordinance, or other similar means that ensures that the siting criteria for distances of 200 feet or less described in the above table will be maintained for the life of the well. Such control shall also provide for a minimum separation distance of at least 200 feet between a public well and sources of contamination listed in Table A* with distances equal to or greater than 200 feet. Proof of legal control should be submitted as part of the construction permit application and shall be submitted prior to issuance of a permit to construct.

When a proposed well is located in an existing well field and will withdraw water from the same aquifer as the existing well or wells, individual separation distances may be waived if substantial historical data is available indicating that no contamination has resulted.

(2) Surface water source. The applicant must submit proof that a proposed surface water source can, through readily available treatment methodology, comply with 567—Chapter 41 and that the raw water source is adequately protected against potential health hazards including, but not limited to, point source discharges, hazardous chemical spills, and the potential sources of contamination listed in Table A.*

*See end of chapter for TABLE A.

After a surface water impoundment has received preliminary approval from the department for use as a raw water source, the owner of the water supply system shall submit proof of legal control through ownership, lease, easement, or other similar means, of contiguous land for a distance of 400 feet from the shoreline at the maximum water level. Legal control shall be for the life of the impoundment and shall control location of sources of contamination within the 400-foot distance. Proof of legal control should be submitted as part of the construction permit application and shall be submitted prior to issuance of a permit to construct.

(3) Below-ground storage facilities. The minimum separation between a below-ground level finished water storage facility and any source of contamination, listed in Table A as being 50 feet or more, shall be 50 feet. Separation distances listed in Table A as being less than 50 feet shall apply to a below-ground level finished water storage facility.

(4) Separation distances. Greater separation distances may be required where necessary to ensure that no adverse effects to water supplies or the existing environment will result. Lesser separation distances may be considered if detailed justification is provided by the applicant's engineer showing that no adverse effects will result from a lesser separation distance, and the regional staff recommends approval of the lesser distance. Such exceptions must be based on special construction techniques or localized geologic or hydrologic conditions.

c. *New source water monitoring.* Water quality monitoring shall be conducted on all new water sources and results submitted to the department prior to placing the new water source into service.

(1) All sources. Water samples shall be collected from each new water source and analyzed for all appropriate contaminants as specified in 567—Chapter 41 consistent with the particular water system classification. If multiple new sources are being added, compositing of the samples (within a single system) shall be allowed in accordance with the composite sampling requirements outlined in 567—Chapter 41. A single sample may be allowed to meet this requirement, if approved by the department. Subsequent water testing shall be conducted consistent with the water system's water supply operation permit monitoring schedule.

(2) Groundwater sources. Water samples collected from groundwater sources in accordance with 43.3(7)“c”(1) shall be conducted at the conclusion of the drawdown/yield test pumping procedure, with the exception of bacteriological monitoring. Bacteriological monitoring must be conducted after disinfection of each new well and subsequent pumping of the chlorinated water to waste. Water samples should also be analyzed for alkalinity, pH, calcium, chloride, copper, hardness, iron, magnesium, manganese, potassium, silica, specific conductance, sodium, sulfate, filterable and nonfilterable solids, and zinc.

(3) Surface water sources. Water samples collected from surface water sources in accordance with 43.3(7)“c”(1) should be collected prior to the design of the surface water treatment facility and shall be conducted and analyzed prior to utilization of the source. The samples shall be collected during June, July, and August. In addition, quarterly monitoring shall be conducted in March, June, September, and December at a location representative of the raw water at its point of withdrawal. Monitoring shall be for turbidity, alkalinity, pH, calcium, chloride, color, copper, hardness, iron, magnesium, manganese, potassium, silica, specific conductance, sodium, sulfate, filterable and nonfilterable solids, carbonate, bicarbonate, algae (qualitative and quantitative), total organic carbon, five-day biochemical oxygen demand, dissolved oxygen, surfactants, nitrogen series (organic, ammonia, nitrite, and nitrate), and phosphate.

43.3(8) *Drinking water system components.* Any drinking water system component which comes into contact with raw, partially treated, or finished water must be suitable for the intended use in a potable water system. The component must meet the current American National Standards Institute/National Sanitation Foundation (ANSI/NSF) Standard 61 specifications, if such specification exists for the particular product, unless approved components are not reasonably available for use, in accordance with guidance provided by the department. If the component does not meet the ANSI/NSF Standard 61 specifications or no specification is available, the person seeking to supply or use the component must prove to the satisfaction of the department that the component is not toxic or otherwise a potential hazard in a potable public water supply system.

43.3(9) *Water treatment filter media material.* For single media filters, grain sizes up to 0.8 mm effective size may be approved for filters designed to remove constituents other than those contained in the primary drinking water standards. Pilot or full-scale studies demonstrating satisfactory treatment efficiency and operation with the proposed media will be required prior to issuing any construction permits which allow filter media sizes greater than 0.55 mm.

43.3(10) *Best available treatment technology.*

a. BATs for organic compounds. The department identifies as indicated in the table below either granular activated carbon (GAC), packed tower aeration (PTA), or oxidation (OXID) as the best available technology, treatment technique, or other means available for achieving compliance with the maximum contaminant level for organic contaminants identified in 567—paragraph 41.5(1) “b.” For the purposes of setting MCLs for synthetic organic chemicals, any BAT must be at least as effective as granular activated carbon.

ORGANIC CONTAMINANT	GAC	PTA	OXID
Alachlor	x		
Aldicarb	x		
Aldicarb sulfone	x		
Aldicarb sulfoxide	x		
Atrazine	x		
Benzene	x	x	
Benzo(a)pyrene	x		
Carbofuran	x		
Carbon tetrachloride	x	x	
Chlordane	x		
2,4-D	x		
Dalapon	x		
Dibromochloropropane (DBCP)	x	x	
o-Dichlorobenzene	x	x	
p-Dichlorobenzene	x	x	
1,2-Dichloroethane	x	x	
cis-1,2-Dichloroethylene	x	x	
trans-1,2-Dichloroethylene	x	x	
1,1-Dichloroethylene	x	x	
Dichloromethane		x	
1,2-Dichloropropane	x	x	
Di(2-ethylhexyl)adipate	x	x	
Di(2-ethylhexyl)phthalate	x		
Dinoseb	x		

Diquat	x		
Endothall	x		
Endrin	x		
Ethylene dibromide (EDB)	x	x	
Ethylbenzene	x	x	
Glyphosate			x
Heptachlor	x		
Heptachlor epoxide	x		
Hexachlorobenzene	x		
Hexachlorocyclopentadiene	x	x	
Lindane	x		
Methoxychlor	x		
Monochlorobenzene	x	x	
Oxamyl (Vydate)	x		
Pentachlorophenol	x		
Picloram	x		
Polychlorinated biphenyls (PCB)	x		
Simazine	x		
Styrene	x	x	
2,4,5-TP (Silvex)	x		
Tetrachloroethylene	x	x	
1,2,4-Trichlorobenzene	x	x	
1,1,1-Trichloroethane	x	x	
1,1,2-Trichloroethane	x	x	
Trichloroethylene	x	x	
2,3,7,8-TCDD (Dioxin)	x		
Toluene	x	x	
Toxaphene	x		
Vinyl chloride		x	
Xylene	x	x	

b. BATs for inorganic compounds. The department identifies the following as the best technology, treatment techniques, or other means available for achieving compliance with the maximum contaminant levels for the inorganic contaminants listed in 567—paragraph 41.3(1) “*b*,” except arsenic and fluoride.

INORGANIC CHEMICAL	BAT(s)
Antimony	2,7
Asbestos	2,3,8
Barium	5,6,7,9
Beryllium	1,2,5,6,7
Cadmium	2,5,6,7
Chromium	2,5,6 ^b ,7
Cyanide	5,7,10
Mercury	2 ^a ,4,6 ^a ,7 ^a
Nickel	5,6,7
Nitrate	5,7,9
Nitrite	5,7
Selenium	1,2 ^c ,6,7,9
Thallium	1,5

Key to BATs

1=Activated Alumina	4=Granular Activated Carbon	7=Reverse Osmosis
2=Coagulation/Filtration	5=Ion Exchange	8=Corrosion Control
3=Direct and Diatomite Filtration	6=Lime Softening	9=Electrodialysis
		10=Chlorine

^aBAT only if influent Hg concentrations are less than or equal to 10 micrograms/liter.

^bBAT for Chromium III only.

^cBAT for Selenium IV only.

c. *BATs for disinfection byproducts and disinfectants.* The department identifies the following as the best technology, treatment techniques, or other means available for achieving compliance with the maximum contaminant levels for the disinfection byproducts listed in 567—paragraph 41.5(2) “b,” and the maximum residual disinfectant levels listed in 567—paragraph 41.5(2) “c.”

DBP MCL or MRDL	Best Available Technology
Bromate MCL	Control of ozone treatment process to reduce production of bromate
Chlorite MCL	Control of treatment processes to reduce disinfectant demand and control of disinfection treatment processes to reduce disinfectant levels
HAA5 MCL	Enhanced coagulation or enhanced softening or GAC10, with chlorine as the primary and residual disinfectant
TTHM MCL	Enhanced coagulation or enhanced softening or GAC10, with chlorine as the primary and residual disinfectant
MRDL	Control of treatment processes to reduce disinfectant demand and control of disinfection treatment processes to reduce disinfectant levels

d. *Requirement to install BAT.* The department shall require community water systems and non-transient noncommunity water systems to install and use any treatment method identified in 43.3(10) as a condition for granting an interim contaminant level except as provided in paragraph “e.” If, after the system’s installation of the treatment method, the system cannot meet the maximum contaminant level, the system shall be eligible for a compliance schedule with an interim contaminant level granted under the provisions of 567—42.2(455B) and 43.2(455B).

e. *Engineering assessment option.* If a system can demonstrate through comprehensive engineering assessments, which may at the direction of the department include pilot plant studies, that the treatment methods identified in 43.3(10) would only achieve a de minimis reduction in contaminants, the department may issue a schedule of compliance that requires the system being granted the variance to examine other treatment methods as a condition of obtaining the interim contaminant level.

f. *Compliance schedule.* If the department determines that a treatment method identified in 43.3(10) “a,” “b,” and “c” is technically feasible, the department may require the system to install or use that treatment method in connection with a compliance schedule issued under the provisions of 567—42.2(455B) and 43.2(455B). The determination shall be based upon studies by the system and other relevant information.

g. *Avoidance of unacceptable risk to health (URTH).* The department may require a public water system to use bottled water, point-of-use devices, point-of-entry devices or other means as a condition of granting a variance or an exemption, or issuance of a compliance schedule, from the requirements of 43.3(10) to avoid an unreasonable risk to health.

567—43.4(455B) Certification of completion. Within 30 days after completion of construction, installation or modification of any project, the permit holder shall submit a certification by a registered professional engineer that the project was completed in accordance with the approved plans and specifications except if the project received a waiver pursuant to 43.3(4).

567—43.5(455B) Filtration and disinfection for surface water and influenced groundwater public water supply systems.

43.5(1) Applicability/general requirements.

a. These rules apply to all public water supply systems using surface water or groundwater under the direct influence of surface water in whole or in part, and establish criteria under which filtration is required as a treatment technique. In addition, these rules establish treatment technique requirements in lieu of maximum contaminant levels for *Giardia lamblia*, heterotrophic plate count bacteria, *Legionella*, viruses and turbidity. Each public water system with a surface water source or a groundwater source under the direct influence of surface water must provide treatment of that source water which complies with these treatment technique requirements. Systems which serve at least 10,000 persons must also comply with the requirements of 43.9(455B). The department may require systems serving less than 10,000 persons to comply with 43.9(455B). The treatment technique requirements consist of installing and properly operating water treatment processes which reliably achieve:

(1) At least 99.9 percent (3-log) removal or inactivation of *Giardia lamblia* cysts between a point where the raw water is not subject to recontamination by surface water runoff and a point downstream before or at the first customer; and

(2) At least 99.99 percent (4-log) removal or inactivation of viruses between a point where the raw water is not subject to recontamination by surface water runoff and a point downstream before or at the first customer.

b. Criteria for identification of groundwater under the direct influence of surface water. "Groundwater under the direct influence of surface water" means any water beneath the surface of the ground with: (1) significant occurrence of insects or other macroorganisms, algae, or large-diameter pathogens such as *Giardia lamblia*, or (2) significant and relatively rapid shifts in water characteristics such as turbidity (particulate content), temperature, conductivity, or pH which closely correlate to climatological or surface water conditions. Direct influence must be determined for individual sources in accordance with criteria established by the department. The department determination of direct influence may be based on site-specific measurements of water quality or documentation of well construction characteristics and geology with field evaluation. Only surface water and groundwater sources under the direct influence of surface water that are at risk to the contamination from *Giardia* cysts are subject to the requirements of this rule. Groundwater sources shall not be subject to this rule. The evaluation process shall be used to delineate between surface water, groundwater under the direct influence of surface water and groundwater. The identification of a source as surface water and groundwater under the direct influence of surface water shall be determined for an individual source, by the department, in accordance with the following criteria. The public water supply shall provide to the department that information necessary to make the determination. The evaluation process will involve one or more of the following steps:

(1) Preliminary review. The department shall conduct a preliminary evaluation of information on the source provided by the public water supply to determine if the source is an obvious surface water (e.g., pond, lake, stream) or groundwater under the direct influence of surface water. The source shall be evaluated during that period of highest susceptibility to influence from surface water. The preliminary evaluation may include a review of surveys, reports, geological information of the area, physical properties of the source, and a review of departmental and public water system records. If the source is identified as a surface water, no additional evaluation shall be conducted. If the source is a groundwater and identified as a deep well, it shall be classified as a groundwater not under the direct influence of surface water and no additional evaluation shall be conducted, unless through direct knowledge or documentation the source does not meet the requirements of 43.5(1)"b"(2). The deep well shall then be evaluated in accordance with 43.5(1)"b"(3). If the source is a shallow well, the source shall be evaluated in accordance with 43.5(1)"b"(2). If the source is a spring, infiltration gallery, radial collector well, or any other subsurface source, it shall be evaluated in accordance with 43.5(1)"b"(3).

(2) Well source evaluation. Shallow wells greater than 50 feet in lateral distance from a surface water source shall be evaluated for direct influence of surface water through a review of departmental or public water system files in accordance with 43.5(1)"b"(2)"1" and 43.5(1)"b"(2)"2." Sources that meet the criteria shall be considered to be not under the direct influence of surface water. No additional evaluation will be required. Shallow wells 50 feet or less in lateral distance from a surface water shall be in accordance with 43.5(1)"b"(3) and (4).

1. Well construction criteria. The well shall be constructed so as to prevent surface water from entering the well or traversing the casing.

2. Water quality criteria. Water quality records shall indicate:

- No record of total coliform or fecal coliform contamination in untreated samples collected over the past three years.

- No history of turbidity problems associated with the well, other than turbidity as a result of inorganic chemical precipitates.

- No history of known or suspected outbreak of *Giardia* or other pathogenic organisms associated with surface water (e.g., *Cryptosporidium*) which has been attributed to the well.

3. Other available data. If data on particulate matter analysis of the well are available, there shall be no evidence of particulate matter present that is associated with surface water. If information on turbidity or temperature monitoring of the well and nearby surface water is available, there shall be no data on the source which correlates with that of a nearby surface water.

4. Further evaluation. Wells that do not meet all the requirements listed shall require further evaluation in accordance with 43.5(1)"b"(3) and (4).

(3) Formal evaluation. The evaluation shall be conducted by the department or registered engineer at the direction of the public water supply. The evaluation shall include:

1. Complete file review. In addition to the information gathered in 43.5(1)“b”(1), the complete file review shall consider but not be limited to: design and construction details; evidence of direct surface water contamination; water quality analysis; indications of waterborne disease outbreaks; operational procedures; and customer complaints regarding water quality or water-related infectious illness. Sources other than a well source shall be evaluated in a like manner to include a field survey.

2. Field survey. A field survey shall substantiate findings of the complete file review and determine if the source is at risk to pathogens from direct surface water influence. The field survey shall examine the following criteria for evidence that surface water enters the source through defects in the source which include but are not limited to: a lack of a surface seal on wells, infiltration gallery laterals exposed to surface water, springs open to the atmosphere, surface runoff entering a spring or other collector, and distances to obvious surface water sources.

A report summarizing the findings of the complete file review and field survey shall be submitted to the department for final review and classification of the source. If the complete file review or field survey demonstrates conclusively that the source is subject to the direct surface water influence, the source shall be classified as under the direct influence of surface water. Either method or both may be used to demonstrate that the source is a surface water or groundwater under the direct influence of surface water. If the findings do not demonstrate conclusive evidence of direct influence of surface water, the analysis outlined in 43.5(1)“b”(4) should be conducted.

(4) Particulate analysis and physical properties evaluation.

1. Surface water indicators. Particulate analysis shall be conducted to identify organisms which only occur in surface waters as opposed to groundwaters, and whose presence in a groundwater would indicate the direct influence of surface water.

- Identification of a *Giardia* cyst, live diatoms, and blue-green, green, or other chloroplast containing algae in any source water shall be considered evidence of direct surface water influence.

- Rotifers and insect parts are indicators of surface water. Without knowledge of which species is present, the finding of rotifers indicates that the source is either directly influenced by surface water, or the water contains organic matter sufficient to support the growth of rotifers. Insects or insect parts shall be considered strong evidence of surface water influence, if not direct evidence.

- The presence of coccidia (e.g., *Cryptosporidium*) in the source water is considered a good indicator of direct influence of surface water. Other macroorganisms (greater than 7 um) which are parasitic to animals and fish such as, but not limited to, helminths (e.g., tapeworm cysts), ascaris, and *Diphylobothrium*, shall be considered as indicators of direct influence of surface water.

2. Physical properties. Turbidity, temperature, pH and conductivity provide supportive, but less direct, evidence of direct influence of surface water. Turbidity fluctuations of greater than 0.5-1.0 NTU over the course of a year may be indicative of direct influence of surface water. Temperature fluctuations may also indicate surface water influence. Changes in other chemical parameters such as pH, conductivity, or hardness may also give an indirect indication of influence by nearby surface water.

c. Compliance. A public water system using a surface water source or a groundwater source under the direct influence of surface water is considered to be in compliance with the requirements of this subrule if it meets the filtration requirements in 43.5(3) and the disinfection requirements in 43.5(2) in accordance with the effective dates specified within the respective subrules.

d. Certified operator requirement. Each public water system using a surface water source or a groundwater source under the direct influence of surface water must be operated by a certified operator who meets the requirements of 567—Chapter 81.

43.5(2) Disinfection. All community and noncommunity public water supply systems using surface water or groundwater under the direct influence of surface water in whole or in part shall be required to provide disinfection in compliance with this subrule and filtration in compliance with 43.5(3). If the department has determined that filtration is required, the system must comply with any interim disinfection requirements the department deems necessary before filtration is installed. A system providing filtration on or before December 30, 1991, must meet the disinfection requirements of this subrule beginning June 29, 1993. A system providing filtration after December 30, 1991, must meet the disinfection requirements of this subrule when filtration is installed. Failure to meet any requirement of this subrule after the applicable date specified in this subrule is a treatment technique violation. The disinfection requirements are as follows:

a. Disinfection treatment criteria. The disinfection treatment must be sufficient to ensure that the total treatment processes of that system achieve at least 99.9 percent (3-log) inactivation or removal of *Giardia lamblia* cysts and at least 99.99 percent (4-log) inactivation or removal of viruses, acceptable to the department.

b. Disinfection system. The disinfection system must include:

(1) Redundant components, including an auxiliary power supply with automatic start-up and alarm to ensure that disinfectant application is maintained continuously while water is being delivered to the distribution system, or

(2) Automatic shutoff of delivery of water to the distribution system whenever there is less than 0.3 mg/L of residual disinfectant concentration in the water. If the department determines that automatic shutoff would cause unreasonable risk to health or interfere with fire protection, the system must comply with 43.5(2)“b”(1).

c. Residual disinfectant entering system. The residual disinfectant concentration in the water entering the distribution system, measured as specified in 43.5(4)“a”(5) and 43.5(4)“b”(2), cannot be less than 0.3 mg/L free residual or 1.5 mg/L total residual chlorine for more than four hours.

d. Residual disinfectant in the system. The residual disinfectant concentration in the distribution system, measured as total chlorine, combined chlorine, or chlorine dioxide, as specified in 43.5(4)“a”(5) and 43.5(4)“b”(2), cannot be undetectable in more than 5 percent of the samples each month for any two consecutive months that the system serves water to the public. Water within the distribution system with a heterotrophic plate count bacteria concentration less than or equal to 500/mL, measured as heterotrophic plate count (HPC) as specified in 567—paragraph 41.2(3)“e,” is deemed to have a detectable disinfectant residual for purposes of determining compliance with this requirement. Therefore, the value “V” in the following formula cannot exceed 5 percent in one month for any two consecutive months.

$$V = \left[\frac{c + d + e}{a + b} \right] \times 100$$

where:

a = number of instances in which the residual disinfectant concentration is measured;

b = number of instances in which the residual disinfectant concentration is not measured but heterotrophic plate count bacteria (HPC) is measured;

c = number of instances in which the residual disinfectant concentration is measured but not detected and no HPC is measured;

d = number of instances in which no residual disinfectant concentration is detected and where the HPC is greater than 500/mL; and

e = number of instances in which the residual disinfectant concentration is not measured and HPC is greater than 500/mL.

43.5(3) Filtration.

a. Applicability. A public water system that uses a surface water source or a groundwater source under the direct influence of surface water must provide treatment consisting of both disinfection, as specified in 43.5(2), and filtration treatment which complies with the turbidity requirements of subrules 43.5(3), 43.5(4), and 43.5(5). A system providing or required to provide filtration on or before December 30, 1991, must meet the requirements of this subrule by June 29, 1993. A system providing or required to provide filtration after December 30, 1991, must meet the requirement of this subrule when filtration is installed. Beginning January 1, 2002, systems serving at least 10,000 people must meet the turbidity requirements in 43.9(455B). A system shall install filtration within 18 months after the department determines, in writing, that filtration is required. The department may require and the system shall comply with any interim turbidity requirements the department deems necessary. Failure to meet any requirements of the referenced subrules after the dates specified is a treatment technique violation.

b. Conventional filtration treatment or direct filtration.

(1) For systems using conventional filtration or direct filtration, the turbidity level of representative samples of a system's filtered water must be less than or equal to 0.5 nephelometric turbidity units (NTU) in at least 95 percent of the measurements taken each month when measured as specified in 43.5(4) "a"(1) and 43.5(4) "b"(1).

(2) The turbidity level of representative samples of a system's filtered water must at no time exceed 5 NTU when measured as specified in 43.5(4) "a"(1) and 43.5(4) "b"(1).

c. Slow sand filtration.

(1) For systems using slow sand filtration, the turbidity level of representative samples of a system's filtered water must be less than or equal to 1 NTU in at least 95 percent of the measurements taken each month when measured as specified in 43.5(4) "a"(1) and 43.5(4) "b"(1).

(2) The turbidity level of representative samples of a system's filtered water must at no time exceed 5 NTU when measured as specified in 43.5(4) "a"(1) and 43.5(4) "b"(1).

d. Diatomaceous earth filtration.

(1) For systems using diatomaceous earth filtration, the turbidity level of representative samples of a system's filtered water must be less than or equal to 1 NTU in at least 95 percent of the measurements taken each month when measured as specified in 43.5(4) "a"(1) and 43.5(4) "b"(1).

(2) The turbidity level of representative samples of a system's filtered water must at no time exceed 5 NTU when measured as specified in 43.5(4) "a"(1) and 43.5(4) "b"(1).

e. Other filtration technologies. A public water system may use either a filtration technology not listed in 43.5(3) "b" to 43.5(3) "d" or a filtration technology listed in 43.5(3) "b" or 43.5(3) "c" at a higher turbidity level if it demonstrates to the department through a preliminary report submitted by a registered professional engineer, using pilot plant studies or other means, that the alternative filtration technology in combination with disinfection treatment that meets the requirements of 43.5(2) consistently achieves 99.9 percent removal or inactivation of *Giardia lamblia* and 99.99 percent removal or inactivation of viruses. For a system that uses alternative filtration technology and makes this demonstration, the turbidity treatment technique requirements are as follows:

(1) The turbidity level of representative samples of a system's filtered water must be less than or equal to 1 NTU in at least 95 percent of the measurements taken each month when measured as specified in 43.5(4) "a"(1) and 43.5(4) "b"(1).

(2) The turbidity level of representative samples of a system's filtered water must at no time exceed 5 NTU when measured as specified in 43.5(4) "a"(1) and 43.5(4) "b"(1).

Beginning January 1, 2002, systems serving at least 10,000 people must meet the requirements for other filtration technologies in 43.9(3) "b."

43.5(4) Analytical and monitoring requirements.

a. *Analytical requirements.* Only the analytical method(s) specified in this paragraph, or otherwise approved by the department, may be used to demonstrate compliance with the requirements of 43.5(2) and 43.5(3). Measurements for pH, temperature, turbidity, and residual disinfectant concentrations must be conducted by a Grade II, III or IV operator meeting the requirements of 567—Chapter 81, any person under the supervision of a Grade II, III or IV operator meeting the requirements of 567—Chapter 81, or a laboratory certified by the department to perform analysis under 567—Chapter 83. For consecutive public water supplies from a surface water or groundwater under the direct influence of surface water system, the disinfectant concentration analyses must be conducted by a certified operator who meets the requirements of 567—Chapter 81. Measurements for heterotrophic plate count bacteria must be conducted by a laboratory certified by the department to do such analysis.

(1) Turbidity analytical methodology. Turbidity analysis shall be conducted using the following methodology:

Methodology	Analytical Method		
	EPA	SM	GLI
Nephelometric	180.1 ¹	2130B ²	Method 2 ³

¹ “Methods for the Determination of Inorganic Substances in Environmental Samples,” EPA-600/R-93-100, August 1993. Available at NTIS, PB94-121811.

² Standard Methods for the Examination of Water and Wastewater, 18th edition, 1992, and 19th edition, 1995 (either edition may be used), American Public Health Association, 1015 Fifteenth Street NW, Washington, DC 20005.

³ GLI Method 2, “Turbidity,” November 2, 1992, Great Lakes Instruments, Inc., 8855 North 55th Street, Milwaukee, WI 53223.

(2) Temperature analytical methodology. The temperature shall be determined in compliance with the methodology listed in 567—subparagraph 41.4(1) “g”(1).

(3) pH (hydrogen ion concentration) analytical methodology. The pH shall be determined in compliance with the methodology listed in 567—subparagraph 41.4(1) “g”(1).

(4) Heterotrophic plate count bacteria analytical methodology. The heterotrophic plate count bacteria sampling and analysis shall be conducted in compliance with 567—subrule 41.2(3) and 43.5(2) “d.” The time from sample collection to initiation of analysis shall not exceed eight hours, and the samples must be held below 10 degrees C during transit.

(5) Residual disinfectant analytical methodology. The residual disinfectant concentrations shall be determined in compliance with one of the analytical methods in the following table. Residual disinfectant concentrations for free chlorine and combined chlorine may also be measured by using DPD colorimetric test kits. Free and total chlorine residuals may be measured continuously by adapting a specified chlorine residual method for use with a continuous monitoring instrument provided the chemistry, accuracy and precision remain the same. Instruments used for continuous monitoring must be calibrated with a grab sample measurement at least every five days.

Disinfectant Analytical Methodology

Residual	Methodology	Methods ^{1,2}
Free chlorine	Amperometric Titration	4500-Cl D
	DPD Ferrous Titrimetric	4500-Cl F
	DPD Colorimetric	4500-Cl G
	Syringaldazine (FACTS)	4500-Cl H
Total chlorine	Amperometric Titration	4500-Cl D
	Amperometric Titration (low level measurement)	4500-Cl E
	DPD Ferrous Titrimetric	4500-Cl F
	DPD Colorimetric	4500-Cl G
	Iodometric Electrode	4500-Cl I
Chlorine dioxide	Amperometric Titration	4500-ClO ₂ C
	DPD Method	4500-ClO ₂ D
	Amperometric Titration	4500-ClO ₂ E
Ozone	Indigo Method	4500-O ₃ B

¹ Standard Methods for the Examination of Water and Wastewater, 18th edition, 1992, and 19th edition, 1995 (either edition may be used), American Public Health Association, 1015 Fifteenth Street NW, Washington, DC 20005.

² Other analytical test procedures are contained within Technical Notes on Drinking Water Methods, EPA-600/R- 94-173, October 1994, which is available as NTIS PB95-104766.

b. *Monitoring requirements.* A public water system that uses a surface water source or ground-water source under the influence of surface water must monitor in accordance with this paragraph or some interim requirements required by the department, until filtration is installed.

(1) Turbidity.

1. Routine turbidity monitoring requirements. Turbidity measurements as required by 43.5(3) must be performed on representative samples of the system’s filtered water every four hours (or more frequently) that the system serves water to the public. A public water system may substitute continuous turbidity monitoring for grab sample monitoring if it validates the continuous measurement for accuracy on a regular basis using a calibration protocol approved by the department and audited for compliance during sanitary surveys. Major elements of the protocol shall include, but are not limited to: method of calibration, calibration frequency, calibration standards, documentation, data collection and data reporting. For any systems using slow sand filtration or filtration treatment other than conventional treatment, direct filtration, or diatomaceous earth filtration, the department may reduce the sampling frequency to once per day if it determines that less frequent monitoring is sufficient to indicate effective filtration performance. For systems serving 500 or fewer persons, the department may reduce the turbidity sampling frequency to once per day, regardless of the type of filtration treatment used, if the department determines that less frequent monitoring is sufficient to indicate effective filtration performance. Approval shall be based upon documentation provided by the system, acceptable to the department and pursuant to the conditions of an operation permit.

2. Turbidity monitoring requirements for population greater than 100,000. A supplier of water serving a population or population equivalent of greater than 100,000 persons shall provide a continuous or rotating cycle turbidity monitoring and recording device or take hourly grab samples to determine compliance with 43.5(3).

(2) Residual disinfectant.

1. Residual disinfectant entering the system. The residual disinfectant concentration of the water entering the distribution system shall be monitored continuously, and the lowest value recorded each day, except that if there is a failure in the continuous monitoring equipment, grab sampling every four hours may be conducted in lieu of continuous monitoring, but not to exceed five working days following the failure of the equipment. If acceptable to the department, systems serving 3,300 or fewer persons may take grab samples in lieu of providing continuous monitoring on an ongoing basis at the frequencies prescribed below:

Residual Disinfectant Samples Required of Surface Water or IGW PWS

System size (persons served)	Samples per day*
500 or fewer	1
501 to 1,000	2
1,001 to 2,500	3
2,501 to 3,300	4

* When more than one grab sample is required per day, the day's samples cannot be taken at the same time. The sampling intervals must be at a minimum of four-hour intervals.

If at any time the disinfectant concentration falls below 0.3 mg/L free residual or 1.5 mg/L total residual chlorine in a system using grab sampling in lieu of continuous monitoring, the system shall take a grab sample every four hours until the residual disinfectant concentration is equal to or greater than 0.3 mg/L free residual or 1.5 mg/L total residual chlorine.

2. Residual disinfectant in the system. The residual disinfectant concentration must be measured at least at the same points in the distribution system and at the same time as total coliforms are sampled, as specified in 567—paragraph 41.2(1)“c,” except that the department may allow a public water system which uses both a surface water source or a groundwater source under direct influence of surface water, and a groundwater source to take residual disinfectant samples at points other than the total coliform sampling points, if these points are included as a part of the coliform sample site plan meeting the requirements of 567—numbered paragraph 41.2(1)“c”(1)“1” and the department determines that such points are representative of treated (disinfected) water quality within the distribution system. Heterotrophic plate count bacteria (HPC) may be measured in lieu of residual disinfectant concentration, using Method 9215B, Pour Plate Method, Standard Methods for the Examination of Water and Wastewater, 18th edition, 1992. The time from sample collection to initiation of analysis shall not exceed eight hours. Samples must be kept below 10 degrees C during transit to the laboratory. All samples must be analyzed by a department-certified laboratory meeting the requirements of 567—Chapter 83.

43.5(5) Reporting requirements. Public water supplies shall report the results of routine monitoring required to demonstrate compliance with 43.5(455B) and treatment technique violations as follows:

a. *Waterborne disease outbreak.* Each system, upon discovering that a waterborne disease outbreak potentially attributable to that water system has occurred, must report that occurrence to the department as soon as possible, but no later than by the end of the next business day.

b. *Turbidity exceeds 5 NTU.* If at any time the turbidity exceeds 5 NTU, the system must inform the department as soon as possible, but no later than by the end of the next business day.

c. *Residual disinfectant entering distribution system below 0.3 mg/L.* If at any time the residual falls below 0.3 mg/L in the water entering the distribution system, the system must notify the department as soon as possible, but no later than by the end of the next business day. The system also must notify the department by the end of the next business day whether or not the residual was restored to at least 0.3 mg/L within four hours.

d. *Routine monitoring reporting requirements.* Routine monitoring results shall be provided as part of the monthly operation reports in accordance with 567—40.3(455B) and 567—subrule 42.4(3).

567—43.6(455B) Residual disinfectant and disinfection byproduct precursors.**43.6(1) Residual disinfectant.***a. Applicability.*

(1) CWS and NTNC systems. This rule establishes criteria under which CWS and NTNC public water supply systems that add a chemical disinfectant to the water in any part of the drinking water treatment process or that provide water that contains a chemical disinfectant must modify their practices to meet the MCLs listed in 567—41.6(455B), the maximum residual disinfectant levels (MRDL) listed in this subrule, and treatment technique requirements for disinfection byproduct precursors listed in subrule 43.6(3).

(2) TNC systems with chlorine dioxide disinfection. This rule establishes criteria under which TNC public water supply systems that use chlorine dioxide as a disinfectant or oxidant must modify their practices to meet the chlorine dioxide MRDL listed in paragraph 43.6(1)“b.”

(3) Compliance dates. Compliance dates for this rule are based upon the source water type and the population served. Systems are required to comply with this rule as follows, unless otherwise noted:

1. Surface water and IGW CWS and NTNC. CWS and NTNC systems using surface water or groundwater under the direct influence of surface water (IGW) in whole or in part and which serve 10,000 or more persons must comply with this rule beginning January 1, 2002. CWS and NTNC surface water or IGW systems serving fewer than 10,000 persons must comply with this rule beginning January 1, 2004.

2. Groundwater CWS and NTNC. CWS and NTNC systems using only groundwater not under the direct influence of surface water must comply with this rule beginning January 1, 2004.

3. TNC using chlorine dioxide. TNC systems serving over 10,000 persons and using surface water or groundwater under the direct influence of surface water and using chlorine dioxide as a disinfectant or oxidant must comply with any requirements for chlorine dioxide in this rule beginning January 1, 2002. TNC systems serving 10,000 persons or less, regardless of source water type, and using chlorine dioxide as a disinfectant or oxidant must comply with any requirements for chlorine dioxide in this rule beginning January 1, 2004.

4. Extension of compliance period for GAC or membrane technology installation. A system that is installing GAC or membrane technology to comply with this rule may apply to the department for an extension of up to 24 months past the dates in 43.6(1)“a”(3), but not beyond December 31, 2003. In granting the extension, the department will set a schedule for compliance and may specify any interim measures the system must take. Failure to meet a compliance schedule or interim treatment requirements constitutes a violation of the public drinking water supply rules, requires public notification per 567—subrule 42.1(1), and may result in an administrative order.

(4) Control of residual disinfectants. Notwithstanding the MRDLs in this rule, systems may increase residual disinfectant levels of chlorine or chloramines (but not chlorine dioxide) in the distribution system to a level and for a time necessary to protect public health, to address specific microbiological contamination problems caused by circumstances such as, but not limited to, distribution line breaks, storm run-off events, source water contamination events, or cross-connection events.

(5) Consecutive systems. Consecutive systems that provide water containing a disinfectant or oxidant are required to comply with this rule. A consecutive system may be incorporated into the sampling plan of the supply that produces the water (the primary water supplier), provided:

1. There is a mutual signed agreement between the primary and consecutive system supplied by that primary system that states the primary system will be responsible for the compliance of its consecutive system with this rule, regardless of additional treatment by the consecutive system.

2. Beginning with the primary water supply, each successive consecutive system must also be included in the primary supply’s sampling plan, so that there is no system with its own sampling plan between the primary supply and the consecutive supply covered by the primary supply’s plan.

3. It is understood by the primary and all consecutive systems that even if only one system in the sampling plan has a violation, all systems in the sampling plan will receive the violation and be required to conduct public notification.

4. The department receives a copy of the signed agreement and approves the sampling plan prior to the beginning of the compliance period.

If a mutual agreement is not possible, each system (the primary system and each consecutive system) is responsible for compliance with this rule for its specific system.

(6) Systems with multiple water sources. Systems with water sources that are used independently from each other, are not from the same source as determined by the department, or do not go through identical treatment processes are required to conduct the monitoring for the applicable disinfectants or oxidants and disinfection byproducts during operation of each source. The system must comply with this rule during the use of each water source.

b. *Maximum residual disinfectant levels.* Maximum residual disinfectant levels (MRDLs) are as follows:

Disinfection Residual	MRDL (mg/L)
Chloramines	4.0 as Cl ₂
Chlorine	4.0 as Cl ₂
Chlorine dioxide	0.8 as ClO ₂

c. *Monitoring requirements for residual disinfectants.*

- (1) General requirements.
 - 1. Systems must take all samples during normal operating conditions.
 - 2. Failure to monitor in accordance with the monitoring plan required under 43.6(1) “c”(1)“5” is a monitoring violation.

3. Failure to monitor is a violation for the entire period covered by the annual average where compliance is based on a running annual average of monthly or quarterly samples or averages and the system’s failure to monitor makes it impossible to determine compliance with MRDLs.

4. Systems may use only data collected under the provisions of this rule or of 567—41.6(455B) to qualify for reduced monitoring.

5. Systems required to monitor under the provisions of this rule or of 567—41.6(455B) must develop and implement a monitoring plan, in accordance with 567—numbered paragraph 41.6(1) “c”(1)“6.”

- (2) Chlorine and chloramines.
 - 1. Routine monitoring. Community and nontransient noncommunity water systems that use chlorine or chloramines must measure the residual disinfectant level at the same points in the distribution system and at the same time as total coliforms are sampled, as specified in 43.5(4) “b”(2)“2.” Surface water and groundwater under the direct influence of surface water systems may use the results of residual disinfectant concentration sampling conducted under 43.5(4) “b”(2)“1,” in lieu of taking separate samples.
 - 2. Reduced monitoring. Chlorine and chloramine monitoring may not be reduced.

- (3) Chlorine dioxide.
 - 1. Routine monitoring. Any public water supply systems that use chlorine dioxide for disinfection or oxidation must take daily samples at the entrance to the distribution system. For any daily sample that exceeds the MRDL, the system must take samples in the distribution system the following day at the locations required by 43.6(1) “c”(3)“2,” in addition to the sample required at the entrance to the distribution system.

2. Additional monitoring. On each day following a routine sample monitoring result that exceeds the MRDL, the system is required to take three chlorine dioxide distribution system samples.

- If chlorine dioxide or chloramines are used to maintain a residual disinfectant in the distribution system, or if chlorine is used to maintain a residual disinfectant in the distribution system and there are no disinfection addition points after the entrance to the distribution system (i.e., no booster chlorination), the system must take three samples as close to the first customer as possible, at intervals of at least six hours.

- If chlorine is used to maintain a residual disinfectant in the distribution system and there are one or more disinfection addition points after the entrance to the distribution system (i.e., booster chlorination), the system must take one sample at each of the following locations: as close to the first customer as possible, in a location representative of average residence time, and as close to the end of the distribution system as possible (reflecting maximum residence time in the distribution system).

3. Reduced monitoring. Chlorine dioxide monitoring may not be reduced.

d. Analytical requirements for residual disinfectants.

(1) Analytical methods. Systems must measure residual disinfectant concentrations for free chlorine, combined chlorine (chloramines), and chlorine dioxide by the methods listed in the following table:

Approved Methods for Residual Disinfectant Compliance Monitoring

Methodology	Standard Methods	ASTM Method	Residual measured ¹			
			Free Chlorine	Combined Chlorine	Total Chlorine	Chlorine Dioxide
Amperometric Titration	4500-Cl D	D 1253-86	X	X	X	
Low Level Amperometric Titration	4500-Cl E				X	
DPD Ferrous Titrimetric	4500-Cl F		X	X	X	
DPD Colorimetric	4500-Cl G		X	X	X	
Syringaldazine (FACTS)	4500-Cl H		X			
Iodometric Electrode	4500-Cl I				X	
DPD	4500-ClO ₂ D					X
Amperometric Method II	4500-ClO ₂ E					X

The procedures shall be done in accordance with the documents listed below. The incorporation by reference of the following documents was approved by the Director of the Federal Register on February 16, 1999, in accordance with 5 U.S.C. 552(a) and 1 CFR Part 51. Copies of the documents may be obtained from the sources listed below. Information regarding obtaining these documents can be obtained from the Safe Drinking Water Hotline at (800)426-4791. Documents may be inspected at EPA's Drinking Water Docket, 401 M Street SW, Washington, DC 20460 (telephone: (202)260-3027); or at the Office of Federal Register, 800 North Capitol Street NW, Suite 700, Washington, DC.

The following method is available from the American Society for Testing and Materials, 100 Barr Harbor Drive, West Conshohocken, PA 19428:

Annual Book of ASTM Standards, Volume 11.01, American Society for Testing and Materials, 1996: Method D 1253-86.

The following methods are available from the American Public Health Association, 1015 Fifteenth Street NW, Washington, DC 20005:

Standard Methods for the Examination of Water and Wastewater, 19th edition, American Public Health Association, 1995: Methods: 4500-Cl D, 4500-Cl E, 4500-Cl F, 4500-Cl G, 4500-Cl H, 4500-Cl I, 4500-ClO₂ D, 4500-ClO₂ E.

¹ X indicates method is approved for measuring specified residual disinfectant.

(2) Test kit use. Systems may also measure residual disinfectant concentrations for chlorine, chloramines, and chlorine dioxide by using DPD colorimetric test kits acceptable to the department. Free and total chlorine residual disinfectant concentrations may be measured continuously by adapting a specified chlorine residual method for use with a continuous monitoring instrument provided the chemistry, accuracy, and precision remain the same. Instruments used for continuous monitoring must be calibrated with a grab sample measurement at least every five days.

(3) Operator requirement. Measurements for residual disinfectant concentration shall be conducted by a Grade A through IV operator meeting the requirements of 567—Chapter 81, any person under the direct supervision of a Grade A through IV operator meeting the requirements of 567—Chapter 81, or a laboratory certified by the department to perform analysis under 567—Chapter 83.

e. Compliance requirements for residual disinfectants.

(1) General requirements.

1. When compliance is based on a running annual average of monthly or quarterly samples or averages and the system's failure to monitor makes it impossible to determine compliance with MRDLs for chlorine and chloramines, this failure to monitor will be treated as a monitoring violation for the entire period covered by the annual average.

2. All samples taken and analyzed under the provisions of this rule must be included in determining compliance, even if that number is greater than the minimum required.

(2) Chlorine and chloramines.

1. Compliance must be based on a running annual arithmetic average, computed quarterly, of monthly averages of all samples collected by the system under 43.6(1) "c"(2). If the average of quarterly averages covering any consecutive four-quarter period exceeds the MRDL, the system is in violation of the MRDL and must notify the public pursuant to 567—42.1(455B), in addition to reporting to the department pursuant to 567—paragraph 42.4(3) "d."

2. In cases where systems switch between the use of chlorine and chloramines for residual disinfection during the year, compliance must be determined by including together all monitoring results of both chlorine and chloramines in calculating compliance. Reports submitted pursuant to 567—paragraph 42.4(3) "d" must clearly indicate which residual disinfectant was analyzed for each sample.

(3) Chlorine dioxide.

1. Acute violations. Compliance must be based on consecutive daily samples collected by the system under 43.6(1) "c"(3). If any daily sample taken at the entrance to the distribution system exceeds the MRDL, and on the following day one or more of the three samples taken in the distribution system exceed the MRDL, the system is in violation of the MRDL and shall take immediate corrective action to lower the level of chlorine dioxide below the MRDL and shall notify the public pursuant to the procedures for acute health risks in 567—subparagraph 42.1(1) "b"(5) in addition to reporting to the department pursuant to 567—paragraph 42.4(3) "d." Failure to take samples in the distribution system the day following an exceedance of the chlorine dioxide MRDL at the entrance to the distribution system will also be considered an MRDL violation and the system must notify the public of the violation in accordance with the provisions for acute violations under 567—subparagraph 42.1(1) "b"(5) in addition to reporting to the department pursuant to 567—paragraph 42.4(3) "d."

2. Nonacute violations. Compliance must be based on consecutive daily samples collected by the system under 43.6(1) "c"(3). If any two consecutive daily samples taken at the entrance to the distribution system exceed the MRDL and all distribution system samples taken are below the MRDL, the system is in violation of the MRDL and must take corrective action to lower the level of chlorine dioxide below the MRDL at the point of sampling and will notify the public pursuant to the procedures for nonacute health violations in 567—subrule 42.1(1), in addition to reporting to the department pursuant to 567—paragraph 42.4(3) "d." Failure to monitor at the entrance to the distribution system the day following an exceedance of the chlorine dioxide MRDL at the entrance to the distribution system is also an MRDL violation and the system must notify the public of the violation in accordance with the provisions for nonacute violations under 567—subrule 42.1(1), in addition to reporting to the department pursuant to 567—paragraph 42.4(3) "d."

f. Reporting requirements for disinfectants. Systems required to sample quarterly or more frequently must report to the department within ten days after the end of each quarter in which samples were collected, notwithstanding the public notification provisions of 567—42.1(455B). Systems required to sample less frequently than quarterly must report to the department within ten days after the end of each monitoring period in which samples were collected. The specific reporting requirements for disinfectants are listed in 567—subparagraph 42.4(3) "d"(3).

43.6(2) Disinfection byproduct precursors.**a. Applicability.**

(1) Surface water or IGW CWS and NTNC systems with conventional filtration. This rule establishes criteria under which surface water or influenced groundwater CWS and NTNC public water supply systems using conventional filtration treatment, as defined in 567—40.2(455B), that add a chemical disinfectant to the water in any part of the drinking water treatment process or which provide water that contains a chemical disinfectant must modify their practices to meet the MCLs listed in 567—41.6(455B) and the maximum residual disinfectant levels (MRDL) and treatment technique requirements for disinfection byproduct precursors listed in this rule.

(2) CWS and NTNC systems using ozone treatment. CWS and NTNC systems that use ozone in their treatment process must comply with the bromide requirements of this subrule.

(3) Compliance dates. Compliance dates for this rule are based upon the population served. CWS and NTNC systems using surface water or groundwater under the direct influence of surface water in whole or in part and which serve 10,000 or more persons must comply with this rule beginning January 1, 2002; while those systems serving fewer than 10,000 persons must comply with this rule beginning January 1, 2004.

(4) The department may require groundwater systems to conduct monitoring for disinfection byproduct precursors as a part of an operation permit.

b. Monitoring requirements for disinfection byproduct precursors.

(1) Routine monitoring. Surface water and groundwater under the direct influence of surface water systems which use conventional filtration treatment must monitor each treatment plant for total organic carbon (TOC) no later than the point of combined filter effluent turbidity monitoring and representative of the treated water. All systems required to monitor under this paragraph must also monitor for TOC in the source water prior to any treatment at the same time as monitoring for TOC in the treated water. These samples (source water and treated water) are referred to as paired samples. At the same time the source water sample is taken, all systems must monitor for alkalinity in the source water prior to any treatment. Systems must take one paired set of source water and treated water samples and one source water alkalinity sample per month per plant at a time representative of normal operating conditions and influent water quality.

(2) Reduced monitoring. The department may allow surface water and groundwater under the direct influence of surface water systems with an average treated water TOC of less than 2.0 mg/L for two consecutive years, or less than 1.0 mg/L for one year, to reduce monitoring for both TOC and alkalinity to one set of paired samples and one source water alkalinity sample per plant per quarter. The system must revert to routine monitoring in the month following the quarter when the annual average treated water TOC is greater than or equal to 2.0 mg/L.

(3) Bromide. The department may allow systems required to analyze for bromate to reduce bromate monitoring from monthly to once per quarter, if the system demonstrates that the average source water bromide concentration is less than 0.05 mg/L based upon representative monthly measurements for one year. The system must continue bromide monitoring to remain on reduced bromate monitoring.

(4) The department may assign disinfection byproduct precursor monitoring prior to the compliance dates in 43.6(2) "a"(2) as part of an operation permit.

c. Analytical requirements for disinfection byproduct precursors.

(1) Analytical methods. Systems required to monitor disinfectant byproduct precursors must use the following methods, which must be conducted by a certified laboratory pursuant to 567—Chapter 83, unless otherwise specified.

Approved Methods for Disinfection Byproduct Precursor Monitoring¹

Analyte	Methodology	EPA	Standard Methods	ASTM	Other
Alkalinity	Titrimetric		2320B	D 1067-92B	
	Electrometric titration				I-1030-85
Bromide	Ion chromatography	300.0			
		300.1			
Dissolved Organic Carbon ²	High temperature combustion		5310B		
	Persulfate-UV or heated-persulfate oxidation		5310C		
	Wet oxidation		5310D		
	Electrometric	150.1	4500-H ⁺ -B	D1293-84	
pH ³	Electrometric	150.2			
Total Organic Carbon ⁴	High temperature combustion		5310B		
	Persulfate-UV or heated-persulfate oxidation		5310C		
	Wet oxidation		5310D		
	UV absorption		5910B		
Ultraviolet Absorption at 254 nm ⁵	UV absorption		5910B		

¹ The procedures shall be done in accordance with the documents listed below. The incorporation by reference of the following documents was approved by the Director of the Federal Register on February 16, 1999, in accordance with 5 U.S.C. 552(a) and 1 CFR Part 51. Copies of the documents may be obtained from the sources listed below. Information regarding obtaining these documents can be obtained from the Safe Drinking Water Hotline at (800)426-4791. Documents may be inspected at EPA's Drinking Water Docket, 401 M Street SW, Washington, DC 20460 (telephone: (202)260-3027); or at the Office of Federal Register, 800 North Capitol Street NW, Suite 700, Washington, DC.

The following methods are available from the American Society for Testing and Materials, 100 Barr Harbor Drive, West Conshohocken, PA 19428: Annual Book of ASTM Standards, Volume 11.01, American Society for Testing and Materials, 1996: Method D 1067-92B and Method D1293-84.

The following methods are available from the National Technical Information Service, U.S. Department of Commerce, 5285 Port Royal Road, Springfield, VA 22161 (telephone: (800)553-6847):

“Determination of Inorganic Anions in Drinking Water by Ion Chromatography, Revision 1.0,” EPA-600/R-98/118, 1997 (NTIS, PB98-169196): Method 300.1.

Methods for Chemical Analysis of Water and Wastes, EPA-600/4-79-020, March 1983, (NTIS PB84-128677): Methods 150.1 and 150.2.

Methods for the Determination of Inorganic Substances in Environmental Samples, EPA-600/R-93/100, August 1993, (NTIS PB94-121811): Method 300.0.

The following methods are available from the American Public Health Association, 1015 Fifteenth Street NW, Washington, DC 20005:

Standard Methods for the Examination of Water and Wastewater, 19th edition, American Public Health Association, 1995: Methods: 2320B, 4500-H⁺-B, and 5910B.

Standard Methods for the Examination of Water and Wastewater, Supplement to the 19th edition, American Public Health Association, 1996: Methods: 5310B, 5310C, and 5310D.

Method I-1030-85 is available from the Books and Open-File Reports Section, U.S. Geological Survey, Federal Center, Box 25425, Denver, CO 80225-0425.

² Dissolved Organic Carbon (DOC). DOC and UV₂₅₄ samples used to determine a SUVA value must be taken at the same time and at the same location, prior to the addition of any disinfectant or oxidant by the system. Prior to analysis, DOC samples must be filtered through a 0.45 µ pore-diameter filter. Water passed through the filter prior to filtration of the sample must serve as the filtered blank. This filtered blank must be analyzed using procedures identical to those used for analysis of the samples and must meet a DOC concentration of <0.5 mg/L. DOC samples must be filtered through the 0.45 µ pore-diameter filter prior to acidification. DOC samples must either be analyzed or must be acidified to achieve pH less than 2.0 by minimal addition of phosphoric or sulfuric acid as soon as practical after sampling, not to exceed 48 hours. Acidified DOC samples must be analyzed within 28 days.

³ pH must be measured by a laboratory certified by the department to perform analysis under 567—Chapter 83; a Grade II, III or IV operator meeting the requirements of 567—Chapter 81; or any person under the supervision of a Grade II, III or IV operator meeting the requirements of 567—Chapter 81.

⁴ Total Organic Carbon (TOC). TOC samples may not be filtered prior to analysis. TOC samples must either be analyzed or must be acidified to achieve pH less than 2.0 by minimal addition of phosphoric or sulfuric acid as soon as practical after sampling, not to exceed 24 hours. Acidified TOC samples must be analyzed within 28 days.

⁵ Ultraviolet Absorption at 254 nm (UV₂₅₄). DOC and UV₂₅₄ samples used to determine a SUVA value must be taken at the same time and at the same location, prior to the addition of any disinfectant or oxidant by the system. UV absorption must be measured at 253.7 nm (may be rounded off to 254 nm). Prior to analysis, UV₂₅₄ samples must be filtered through a 0.45 µ pore-diameter filter. The pH of UV₂₅₄ samples may not be adjusted. Samples must be analyzed as soon as practical after sampling, not to exceed 48 hours.

(2) SUVA. Specific Ultraviolet Absorbance (SUVA) is equal to the UV absorption at 254nm (UV_{254}) (measured in m^{-1}) divided by the dissolved organic carbon (DOC) concentration (measured as mg/L). In order to determine SUVA, it is necessary to separately measure UV_{254} and DOC. When determining SUVA, systems must use the methods stipulated in subparagraph 43.6(1) "c"(1) to measure DOC and UV_{254} . SUVA must be determined on water prior to the addition of disinfectants/oxidants by the system. DOC and UV_{254} samples used to determine an SUVA value must be taken at the same time and at the same location.

d. Compliance requirements for disinfection byproduct precursors.

(1) General requirements. All samples taken and analyzed under the provisions of this rule must be included in determining compliance, even if that number is greater than the minimum required.

(2) Compliance determination. Compliance must be determined as specified by 43.6(3) "c." The department may assign monitoring through an operation permit, or systems may begin monitoring to determine whether Step 1 TOC removals can be met 12 months prior to the compliance date for the system. This monitoring is not required and failure to monitor during this period is not a violation. However, any system that does not monitor during this period and then determines in the first 12 months after the compliance date that it is not able to meet the Step 1 requirements in 43.6(3) "b"(2), and must therefore apply for alternate minimum TOC removal (Step 2) requirements, is not eligible for retroactive approval of alternate minimum TOC removal (Step 2) requirements as allowed pursuant to 43.6(3) "b"(3) and is in violation. Systems may apply for alternate minimum TOC removal (Step 2) requirements anytime after the compliance date. For systems required to meet Step 1 TOC removals, if the value calculated under 43.6(3) "c"(1) "4" is less than 1.00, the system is in violation of the treatment technique requirements and must notify the public pursuant to 567—42.1(455B), in addition to reporting to the department pursuant to 567—paragraph 42.4(3) "d."

e. Reporting requirements for disinfection byproduct precursors. Systems required to sample quarterly or more frequently must report to the department within ten days after the end of each quarter in which samples were collected, notwithstanding the public notification provisions of 567—42.1(455B). Systems required to sample less frequently than quarterly must report to the department within ten days after the end of each monitoring period in which samples were collected. The specific reporting requirements for disinfection byproduct precursors are listed in 567—subparagraph 42.4(3) "d"(4).

43.6(3) Treatment technique for control of disinfection byproduct precursors.

a. Applicability.

(1) Systems using surface water or groundwater under the direct influence of surface water and conventional filtration treatment (as defined in 567—40.2(455B)) must operate with enhanced coagulation or enhanced softening to achieve the TOC percent removal levels specified in paragraph "b" of this subrule unless the system meets at least one of the alternative compliance criteria listed in 43.6(3) "a"(2) or (3).

(2) Alternative compliance criteria for enhanced coagulation and enhanced softening systems. Systems using surface water or groundwater under the direct influence of surface water and conventional filtration treatment may use the alternative compliance criteria in 43.6(3) "a"(2) "1" through "6" to comply with this subrule in lieu of complying with 43.6(3) "b." Systems must still comply with monitoring requirements in 43.6(2) "b."

1. The system's source water TOC level, measured according to 43.6(2) "c"(1), is less than 2.0 mg/L, calculated quarterly as a running annual average.

2. The system's treated water TOC level, measured according to 43.6(2) "c"(1), is less than 2.0 mg/L, calculated quarterly as a running annual average.

3. The system’s source water TOC level, measured according to 43.6(2) “c”(1), is less than 4.0 mg/L, calculated quarterly as a running annual average; the source water alkalinity, measured according to 43.6(2) “c”(1), is greater than 60 mg/L as CaCO₃, calculated quarterly as a running annual average; and either the TTHM and HAA5 running annual averages are no greater than 0.040 mg/L and 0.030 mg/L, respectively; or prior to the effective date for compliance in 567—subparagraph 41.6(1) “a”(3) and in 43.6(1) “a”(3) and 43.6(2) “a”(3), the system has made a clear and irrevocable financial commitment not later than the effective date for compliance in 567—subparagraph 41.6(1) “a”(3) and in 43.6(1) “a”(3) and 43.6(2) “a”(3), to use of technologies that will limit the levels of TTHMs and HAA5 to no more than 0.040 mg/L and 0.030 mg/L, respectively. Systems must submit evidence of a clear and irrevocable financial commitment, in addition to a schedule containing milestones and periodic progress reports for installation and operation of appropriate technologies, to the department for approval not later than the effective date for compliance in 567—subparagraph 41.6(1) “a”(3) and in 43.6(1) “a”(3) and 43.6(2) “a”(3). These technologies must be installed and operating not later than June 30, 2005. Failure to install and operate these technologies by the date in the approved schedule will constitute a treatment technique violation.

4. The TTHM and HAA5 running annual averages are less than or equal to 0.040 mg/L and 0.030 mg/L, respectively, and the system uses only chlorine for primary disinfection and maintenance of a residual in the distribution system.

5. The system’s source water SUVA, prior to any treatment and measured monthly according to 43.6(2) “c,” is less than or equal to 2.0 L/mg-m, calculated quarterly as a running annual average.

6. The system’s finished water SUVA, measured monthly according to 43.6(2) “c,” is less than or equal to 2.0 L/mg-m, calculated quarterly as a running annual average.

(3) Additional alternative compliance criteria for softening systems. Systems practicing enhanced softening that cannot achieve the TOC removals required by 43.6(3) “b”(2) may use the alternative compliance criteria in 43.6(3) “a”(3) “1” and “2” in lieu of complying with 43.6(3) “b.” Systems must still comply with monitoring requirements in 43.6(2) “b.”

1. Softening that lowers the treated water alkalinity to less than 60 mg/L as CaCO₃, measured monthly according to 43.6(2) “c” and calculated quarterly as a running annual average.

2. Softening that removes at least 10 mg/L of magnesium hardness as CaCO₃, measured monthly and calculated quarterly as a running annual average.

b. Enhanced coagulation and enhanced softening performance requirements.

(1) Systems must achieve the percent reduction of TOC specified in 43.6(3) “b”(2) between the source water and the combined filter effluent, unless the department approves a system’s request for alternate minimum TOC removal (Step 2 requirements under 43.6(3) “b”(3)).

(2) Required Step 1 TOC reductions, indicated in the following table, are based upon specified source water parameters measured in accordance with 43.6(2) “c.” Systems using softening are required to meet the Step 1 TOC reductions in the right-hand column (Source water alkalinity > 120 mg/L) for the specified source water TOC:

Step 1 Required Removal of TOC by Enhanced Coagulation and Enhanced Softening for Surface Water or IGW Systems Using Conventional Treatment^{1,2}

Source water TOC, mg/L	Source water Alkalinity, mg/L as CaCO ₃		
	0-60	>60-120	>120 ³
>2.0 - 4.0	35.0 %	25.0 %	15.0 %
>4.0 - 8.0	45.0 %	35.0 %	25.0 %
>8.0	50.0 %	40.0 %	30.0 %

¹ Systems meeting at least one of the conditions in 43.6(3) “a”(2) “1” to “6” are not required to operate with enhanced coagulation.
² Softening systems meeting one of the alternative compliance criteria in 43.6(3) “a”(3) are not required to operate with enhanced softening.
³ Systems practicing softening must meet the TOC removal requirements in this column.

(3) Surface water and groundwater under the influence of surface water systems using conventional treatment that cannot achieve the Step 1 TOC removals required by 43.6(3) “b”(2) due to water quality parameters or operational constraints must apply to the department for approval of alternative minimum Step 2 TOC removal requirements submitted by the system within three months of failure to achieve the TOC removals required by 43.6(3) “b”(2). If the department approves the alternative minimum Step 2 TOC removal requirements, the department may make those requirements retroactive for the purposes of determining compliance. The system must meet the Step 1 TOC removals contained in 43.6(3) “b”(2) until the department approves the alternate minimum Step 2 TOC removal requirements.

(4) Alternate minimum Step 2 TOC removal requirements. Applications made to the department by enhanced coagulation systems for approval of alternate minimum Step 2 TOC removal requirements under 43.6(3) “b”(3) must include, as a minimum, results of bench-scale or pilot-scale testing conducted under 43.6(3) “b”(4) “1” below and be used to determine the alternate enhanced coagulation level.

1. Alternate enhanced coagulation level. Alternate enhanced coagulation level is defined as coagulation at a coagulant dose and pH as determined by the method described in 43.6(3) “b”(4) “1” to “5” such that an incremental addition of 10 mg/L of alum (or equivalent amount of ferric salt) results in a TOC removal of less than or equal to 0.3 mg/L. The percent removal of TOC at this point on the “TOC removal versus coagulant dose” curve is then defined as the minimum TOC removal required for the system. Once approved by the department, this minimum requirement supersedes the minimum TOC removal required by the table in 43.6(3) “b”(2). This requirement will be effective until such time as the department approves a new value based on the results of a new bench-scale or pilot-scale test. Failure to achieve department-set alternative minimum TOC removal levels is a treatment technique violation.

2. Bench-scale or pilot-scale testing of enhanced coagulation must be conducted by using representative water samples and adding 10 mg/L increments of alum (or equivalent amounts of ferric salt) until the pH is reduced to a level less than or equal to the enhanced coagulation Step 2 target pH shown in the following table:

Enhanced Coagulation Step 2 Target pH

Alkalinity (mg/L as CaCO ₃)	Target pH
0-60	5.5
>60-120	6.3
>120-240	7.0
>240	7.5

3. For waters with alkalinities of less than 60 mg/L for which addition of small amounts of alum or equivalent addition of iron coagulant drives the pH below 5.5 before significant TOC removal occurs, the system must add necessary chemicals to maintain the pH between 5.3 and 5.7 in samples until the TOC removal of 0.3 mg/L per 10 mg/L alum added (or equivalent addition of iron coagulant) is reached.

4. The system may operate at any coagulant dose or pH necessary (consistent with other public drinking water rules in 567—Chapters 41 through 43) to achieve the minimum TOC percent removal approved under 43.6(3) “b”(3).

5. If the TOC removal is consistently less than 0.3 mg/L of TOC per 10 mg/L of incremental alum dose at all dosages of alum (or equivalent addition of iron coagulant), the water is deemed to contain TOC not amenable to enhanced coagulation. The system may then apply to the department for a waiver of enhanced coagulation requirements.

c. *Compliance calculations.*

(1) Surface water or groundwater under the influence of surface water systems other than those identified in 43.6(3) "a"(2) or (3) must comply with requirements contained in 43.6(3) "b"(2) or (3). Systems must calculate compliance quarterly, beginning after the system has collected 12 months of data, by determining an annual average using the following method:

1. Step 1: Determine actual monthly TOC percent removal using the following equation, to two decimal places:

$$\text{Actual monthly TOC percent removal} = 1 - \left(\frac{\text{treated water TOC}}{\text{source water TOC}} \right) \times 100$$

2. Step 2: Determine the required monthly TOC percent removal from either 43.6(3) "b"(2) or (3).

3. Step 3: Divide the "actual monthly TOC percent removal" value (from Step 1) by the "required monthly TOC percent removal" value (from Step 2). Determine this value for each of the last 12 months.

$$\text{Monthly percent removal ratio} = \frac{\text{actual monthly TOC percent removal}}{\text{required monthly TOC percent removal}}$$

4. Step 4: Add together the "monthly percent removal ratio" values from Step 3 for each of the last 12 months and divide by 12, to determine the annual average value.

$$\text{Annual average} = \frac{\sum \text{monthly percent removal ratio}}{12}$$

5. Step 5: If the "annual average" value calculated in Step 4 is less than 1.00, the system is not in compliance with the TOC percent removal requirements.

(2) Systems may use the provisions in 43.6(3) "c"(2)"1" through "5" in lieu of the calculations in 43.6(3) "c"(1)"1" through "5" to determine compliance with TOC percent removal requirements.

1. In any month that the system's treated or source water TOC level, measured according to 43.6(2) "c"(1), is less than 2.0 mg/L, the system may assign a monthly value of 1.0 (in lieu of the value calculated in 43.6(3) "c"(1)"3") when calculating compliance under the provisions of 43.6(3) "c"(1).

2. In any month that a system practicing softening removes at least 10 mg/L of magnesium hardness as CaCO₃, the system may assign a monthly value of 1.0 (in lieu of the value calculated in 43.6(3) "c"(1)"3") when calculating compliance under the provisions of 43.6(3) "c"(1).

3. In any month that the system's source water SUVA, prior to any treatment and measured according to 43.6(2) "c"(2), is less than or equal to 2.0 L/mg-m, the system may assign a monthly value of 1.0 (in lieu of the value calculated in 43.6(3) "c"(1)"3") when calculating compliance under the provisions of 43.6(3) "c"(1).

4. In any month that the system's finished water SUVA, measured according to 43.6(2) "c"(2), is less than or equal to 2.0 L/mg-m, the system may assign a monthly value of 1.0 (in lieu of the value calculated in 43.6(3) "c"(1)"3") when calculating compliance under the provisions of 43.6(3) "c"(1).

5. In any month that a system using enhanced softening lowers alkalinity below 60 mg/L as CaCO₃, the system may assign a monthly value of 1.0 (in lieu of the value calculated in 43.6(3) "c"(1)"3") when calculating compliance under the provisions of 43.6(3) "c"(1).

(3) Surface water or groundwater under the direct influence of surface water systems using conventional treatment may also comply with the requirements of this subrule by meeting the criteria in 43.6(3) "a"(2) or (3).

d. *Treatment technique requirements for disinfection byproduct precursors.* The treatment techniques to control the level of disinfection byproduct precursors in drinking water treatment and distribution systems, for surface water or groundwater under the direct influence of surface water systems using conventional filtration treatment, are enhanced coagulation or enhanced softening.

567—43.7(455B) Lead and copper treatment techniques.**43.7(1) Corrosion control.**

a. Applicability of corrosion control treatment steps to small, medium-size and large water systems. (Corrosion control treatment compliance dates.) Systems shall complete the applicable corrosion control treatment requirements by the following deadlines:

(1) Population >50,000. Large systems (serving greater than 50,000 persons) shall complete the corrosion control treatment steps specified in 43.7(1)“d,” unless it is deemed to have optimized corrosion control under 43.7(1)“b”(2) or (3).

(2) Population ≤50,000. Small systems (serving less than or equal to 3,300 persons) and medium-size systems (serving greater than 3,300 and less than or equal to 50,000 persons) shall complete the corrosion control treatment steps specified in 43.7(1)“e,” unless it has optimized corrosion control under 43.7(1)“b”(1), (2), or (3).

b. Optimum corrosion control. A public water supply system has optimized corrosion control and is not required to complete the applicable corrosion control treatment steps identified in this subrule if the system satisfies one of the following criteria:

(1) A small or medium-size water supply system has optimized corrosion control if the system meets the lead and copper action levels during each of two consecutive six-month monitoring periods, conducted in accordance with 567—paragraph 41.4(1)“c.”

(2) Any public water supply system may be deemed to have optimized corrosion control treatment if the system demonstrates to the satisfaction of the department that it has conducted activities equivalent to the corrosion control steps applicable to such system under this subrule. If the department makes this determination, it shall provide the water supply system with written notice explaining the basis for its decision and shall specify the water quality control parameters representing optimal corrosion control in accordance with 43.7(2)“f.” A system shall provide the department with the following information in order to support a determination under this paragraph:

1. The results of all test samples collected for each of the water quality parameters in 43.7(2)“c”(3);

2. A report explaining the test methods used by the water system to evaluate the corrosion control treatments listed in 43.7(2)“c”(1), the results of all tests conducted, and the basis for the system’s selection of optimal corrosion control treatment;

3. A report explaining how corrosion control was installed and how it is being maintained to ensure minimal lead and copper concentrations at consumers’ taps; and

4. The results of tap water samples collected in accordance with 567—paragraph 41.4(1)“c” at least once every six months for one year after corrosion control has been installed.

(3) Any water system has optimized corrosion control if it submits results of tap water monitoring conducted in accordance with 567—paragraph 41.4(1)“c” and source water monitoring conducted in accordance with 567—paragraph 41.4(1)“e” that demonstrate for two consecutive six-month monitoring periods that the difference between the 90th percentile tap water lead level computed under 567—subparagraph 41.4(1)“b”(3) and the highest source water lead concentration is less than the practical quantitation level for lead specified in 567—paragraph 41.4(1)“g.”

c. *Recommence corrosion control.* Any small or medium-size water system that is required to complete the corrosion control steps due to its exceedance of the lead or copper action level may cease completing the treatment steps whenever the system meets both action levels during each of two consecutive monitoring periods conducted pursuant to 567—paragraph 41.4(1)“c” and submits the results to the department. If any such water system thereafter exceeds the lead or copper action level during any monitoring period, the system shall recommence completion of the applicable treatment steps, beginning with the first treatment step which was not previously completed in its entirety. The department may require a system to repeat treatment steps previously completed by the system when it is determined by the department that this is necessary to implement properly the treatment requirements of this rule. The department will notify the system in writing of such a determination and explain the basis for its decision. The requirement for any small or medium-size system to implement corrosion control treatment steps in accordance with 43.7(1)“e” (including systems deemed to have optimized corrosion control under 43.7(1)“b”(1)) is triggered whenever any small or medium-size system exceeds the lead or copper action level.

d. *Treatment steps and deadlines for large systems.* Except as provided in 43.7(1)“b”(2) or (3), large systems shall complete the following corrosion control treatment steps (described in the referenced portions of 43.7(1)“b,” subrule 43.7(2), and 567—paragraphs 41.4(1)“c” and “d”) by the dates indicated below.

(1) Step 1. The system shall conduct initial monitoring pursuant to 567—paragraph 41.4(1)“c”(4)“1” and 567—paragraph 41.4(1)“d”(2) during two consecutive six-month monitoring periods by January 1, 1993.

(2) Step 2. The system shall complete corrosion control studies pursuant to 43.7(2)“c” by July 1, 1994.

(3) Step 3. The department will designate optimal corrosion control treatment within six months of receiving the corrosion control study results (by January 1, 1995).

(4) Step 4. The system shall install optimal corrosion control treatment by January 1, 1997.

(5) Step 5. The system shall complete follow-up sampling pursuant to 567—paragraph 41.4(1)“c”(4)“2” and 567—paragraph 41.4(1)“d”(3) by January 1, 1998.

(6) Step 6. The department will review installation of treatment and designate optimal water quality control parameters pursuant to 43.7(2)“f” by July 1, 1998.

(7) Step 7. The system shall operate in compliance with optimal water quality control parameters delineated by the department and continue to conduct tap sampling.

e. *Treatment steps and deadlines for small and medium-size systems.* Except as provided in 43.7(2), small and medium-size systems shall complete the following corrosion control treatment steps (described in subrule 43.7(2) and 567—paragraphs 41.4(1)“c” and “d”) by the indicated time periods listed below.

(1) Step 1. The system shall conduct initial tap sampling pursuant to 567—paragraph 41.4(1)“c”(4)“1” and 567—paragraph 41.4(1)“d”(2) until the system either exceeds the lead or copper action level or becomes eligible for reduced monitoring under 567—paragraph 41.4(1)“c”(4)“4.” A system exceeding the lead or copper action level shall recommend optimal corrosion control treatment under 43.7(2)“a” within six months after it exceeds one of the action levels.

(2) Step 2. Within 12 months after a system exceeds the lead or copper action level, the department may require the system to perform corrosion control studies under 43.7(2)“b.” If the system is not required to perform such studies, the department will specify optimal corrosion control treatment under 43.7(2)“d” as follows: for medium-size systems, within 18 months after such system exceeds the lead or copper action level, and, for small systems, within 24 months after such system exceeds the lead or copper action level.

(3) Step 3. If a system is required to perform corrosion control studies under Step 2, the system shall complete the studies (under 43.7(2)“c”) within 18 months after such studies are required to commence.

(4) Step 4. If the system has performed corrosion control studies under Step 2, the department will designate optimal corrosion control treatment under 43.7(2) "d" within six months after completion of Step 3.

(5) Step 5. The system shall install optimal corrosion control treatment under 43.7(2) "e" within 24 months after such treatment is designated.

(6) Step 6. The system shall complete follow-up sampling pursuant to 567—paragraph 41.4(1) "c"(4)"2" and 567—paragraph 41.4(1) "d"(3) within 36 months after optimal corrosion control treatment is designated.

(7) Step 7. The department will review the system's installation of treatment and designate optimal water quality control parameters pursuant to 43.7(2) "f" within six months after completion of Step 6.

(8) Step 8. The system shall operate in compliance with the department-designated optimal water quality control parameters under 43.7(2) "f" (and continue to conduct tap sampling as per 567—paragraph 41.4(1) "c"(4)"3" and 567—paragraph 41.4(1) "d"(4)).

43.7(2) Description of corrosion control treatment requirements. Each public water supply system shall complete the corrosion control treatment requirements described below which are applicable to such systems under 43.7(1).

a. *Public water supply system recommendation regarding corrosion control treatment.* Based upon the results of lead and copper tap monitoring and water quality parameter monitoring, small and medium-size water systems exceeding the lead or copper action level shall recommend installation of one or more of the corrosion control treatments listed in 43.7(2) "c" which the system believes constitute optimal corrosion control for that system. The department may require the system to conduct additional water quality parameter monitoring in accordance with 567—paragraph 41.4(1) "d"(2) to assist in reviewing the system's recommendation.

b. *Department decision to require studies of corrosion control treatment (applicable to small and medium-size systems).* The department may require any small or medium-size system that exceeds the lead or copper action level to perform corrosion control studies under 43.7(2) "c" to identify optimal corrosion control treatment for the system.

c. *Performance of corrosion control studies.*

(1) Any public water supply system performing corrosion control studies shall evaluate the effectiveness of each of the following treatments and, if appropriate, combinations of the following treatments to identify the optimal corrosion control treatment: alkalinity and pH adjustment; calcium hardness adjustment; and the addition of a phosphate or silicate-based corrosion inhibitor at a concentration sufficient to maintain an effective residual concentration in all test tap samples.

(2) The water system shall evaluate each of the corrosion control treatments using either pipe rig/loop tests, metal coupon tests, partial-system tests, or analyses based on documented analogous treatments with other systems of similar size, water chemistry and distribution system configuration.

(3) The public water supply system shall measure the following water quality parameters in any tests conducted under this paragraph before and after evaluating the corrosion control treatments listed above:

1. Lead;
2. Copper;
3. pH;
4. Alkalinity;
5. Calcium;
6. Conductivity;
7. Orthophosphate (when an inhibitor containing a phosphate compound is used);
8. Silicate (when an inhibitor containing a silicate compound is used);
9. Water temperature.

(4) The public water supply system shall identify all chemical or physical constraints that limit or prohibit the use of a particular corrosion control treatment and outline such constraints with the following: data and documentation showing that a particular corrosion control treatment has adversely affected other water treatment processes when used by another water system with comparable water quality characteristics; or data and documentation demonstrating that the water system has previously attempted to evaluate a particular corrosion control treatment and has found that the treatment is ineffective or adversely affects other water quality treatment processes.

(5) The water system shall evaluate the effect of the chemicals used for corrosion control treatment on other water quality treatment processes.

(6) On the basis of an analysis of the data generated during each evaluation, the water system shall recommend in writing to the department the treatment option that the corrosion control studies indicate constitutes optimal corrosion control treatment for that system. The water system shall provide a rationale for its recommendation along with all supporting documentation required by 43.7(2)“c”(1) through (5).

d. Department designation of optimal corrosion control treatment.

(1) Based upon consideration of available information including, where applicable, studies performed under 43.7(2)“c” and a system’s recommended treatment alternative, the department will either approve the corrosion control treatment option recommended by the public water supply system, or designate alternative corrosion control treatment(s) from among those listed in 43.7(2)“c.” The department will consider the effects that additional corrosion control treatment will have on water quality parameters and on other water quality treatment processes (when designating optimal corrosion control treatment).

(2) The department will notify the public water supply system of its decision on optimal corrosion control treatment in writing and explain the basis for this determination. If the department requests additional information to aid its review, the public water supply system shall provide the information.

e. Installation of optimal corrosion control. Each public water supply system shall properly install and operate throughout its distribution system the optimal corrosion control treatment designated under 43.7(2)“d.”

f. Department review of treatment and specification of optimal water quality control parameters.

(1) The department will evaluate the results of all lead and copper tap samples and water quality parameter samples submitted by the public water supply system and determine whether the system has properly installed and operated the optimal corrosion control treatment designated in 43.7(2)“d.” Upon reviewing the results of tap water and water quality parameter monitoring by the public water supply system, both before and after the system installs optimal corrosion control treatment, the department will designate the following:

1. A minimum value or a range of values for pH measured at each entry point to the distribution system;

2. A minimum pH value, measured in all tap samples. Such value shall be equal to or greater than 7.0 unless meeting a pH level of 7.0 is not technologically feasible or is not necessary for the public water supply system to optimize corrosion control;

3. If a corrosion inhibitor is used, a minimum concentration or a range of concentrations for the inhibitor, measured at each entry point to the distribution system and in all tap samples, necessary to form a passivating film on the interior walls of the pipes of the distribution system;

4. If alkalinity is adjusted as part of optimal corrosion control treatment, a minimum concentration or a range of concentrations for alkalinity, measured at each entry point to the distribution system and in all tap samples; or

5. If calcium carbonate stabilization is used as part of corrosion control, a minimum concentration or a range of concentrations for calcium, measured in all tap samples.

(2) The values for the applicable water quality control parameters listed above shall be those which reflect optimal corrosion control treatment for the public water supply system. The department may designate values for additional water quality control parameters determined by the department to reflect optimal corrosion control for the system. The department will notify the system in writing of these determinations and explain the basis for its decisions.

g. Continued operation and monitoring. All public water supply systems shall maintain water quality parameter values at or above minimum values or within ranges designated by the department under 43.7(2)“f” in each sample collected under 567—paragraph 41.4(1)“d”(4). If the water quality parameter value of any sample is below the minimum value or outside the range designated, the public water supply system is out of compliance. As specified in 567—paragraph 41.4(1)“d”(4), the public water supply system may take a confirmation sample for any water quality parameter value no later than three days after the first sample. If a confirmation sample is taken, the result must be averaged with the first sampling result and the average must be used for any compliance determinations under this paragraph.

h. Modification of department treatment decisions. A determination of the optimal corrosion control treatment under 43.7(2)“d” or optimal water quality control parameters under 43.7(2)“f” may be modified. A request for modification by a public water supply system or other interested party shall be in writing, explain why the modification is appropriate, and provide supporting documentation. The department may modify its determination when it concludes that such change is necessary to ensure that the public water supply system continues to optimize corrosion control treatment. A revised determination will be made in writing, which will set forth the new treatment requirements, explain the basis for the decision, and provide an implementation schedule for completing the treatment modifications.

43.7(3) Source water treatment requirements. Public water supply systems shall complete the applicable source water monitoring and treatment requirements, as described in the referenced portions of 43.7(3)“b,” and in 567—paragraphs 41.4(1)“c” and “e,” by the following deadlines.

a. Deadlines for completing source water treatment steps.

(1) Step 1. A public water supply system exceeding the lead or copper action level shall complete lead and copper source water monitoring under 567—paragraph 41.4(1)“e”(2) and make a written treatment recommendation to the department within six months after exceeding the lead or copper action level.

(2) Step 2. The department will make a determination regarding source water treatment pursuant to 43.7(3)“b”(2) within six months after submission of monitoring results under Step 1.

(3) Step 3. If installation of source water treatment is required, the system shall install the treatment pursuant to 43.7(3)“b”(3) within 24 months after completion of Step 2.

(4) Step 4. The public water supply system shall complete follow-up tap water monitoring under 567—paragraph 41.4(1)“c”(4)“2” and source water monitoring under 567—paragraph 41.4(1)“e”(3) within 36 months after completion of Step 2.

(5) Step 5. The department will review the system’s installation and operation of source water treatment and specify maximum permissible source water levels under 43.7(3)“b”(4) within six months after completion of Step 4.

(6) Step 6. The public water supply system shall operate in compliance with the specified maximum permissible lead and copper source water levels under 43.7(3)“b”(4) and continue source water monitoring pursuant to 567—paragraph 41.4(1)“e”(4).

b. Description of source water treatment requirements.

(1) System treatment recommendation. Any system which exceeds the lead or copper action level shall recommend in writing to the department the installation and operation of one of the source water treatments listed in 43.7(3)“b”(2). A system may recommend that no treatment be installed based upon a demonstration that source water treatment is not necessary to minimize lead and copper levels at users’ taps.

(2) Source water treatment determinations. The department will complete an evaluation of the results of all source water samples submitted by the public water supply system to determine whether source water treatment is necessary to minimize lead or copper levels in water delivered to users' taps. If the department determines that treatment is needed, the department will require installation and operation of the source water treatment recommended by the public water supply system or require the installation and operation of another source water treatment from among the following: ion exchange, reverse osmosis, lime softening or coagulation/filtration. If the department requests additional information to aid in its review, the water system shall provide the information by the date specified in its request. The department will notify the system in writing of its determination and set forth the basis for its decision.

(3) Installation of source water treatment. Public water supply systems shall properly install and operate the source water treatment designated by the department under 43.7(3) "b"(2).

(4) Department review of source water treatment and specification of maximum permissible source water levels. The department will review the source water samples taken by the water supply system both before and after the system installs source water treatment and determine whether the public water supply system has properly installed and operated the designated source water treatment. Based upon its review, the department will designate maximum permissible lead and copper concentrations for finished water entering the distribution system. Such levels shall reflect the contaminant removal capability of the treatment (properly operated and maintained). The department will notify the public water supply system in writing and explain the basis for its decision.

(5) Continued operation and maintenance. Each public water supply system shall maintain lead and copper levels below the maximum permissible concentrations designated by the department at each sampling point monitored in accordance with 567—paragraph 41.4(1) "e." The system is out of compliance with this paragraph if the level of lead or copper at any sampling point is greater than the maximum permissible designated concentration.

(6) Modification of treatment decisions. The department may modify its determination of the source water treatment under 43.7(3) "b"(6), or maximum permissible lead and copper concentrations for finished water entering the distribution system under 43.7(3) "b"(4). A request for modification by a public water supply system or other interested party shall be in writing, explain why the modification is appropriate, and provide supporting documentation. The department may modify its determination where it concludes that such change is necessary to ensure that the system continues to minimize lead and copper concentrations in source water. A revised determination will be made in writing, set forth the new treatment requirements, explain the basis for the decision, and provide an implementation schedule for completing the treatment modifications.

43.7(4) Lead service line replacement requirements.

a. Applicability. Public water supply systems that fail to meet the lead action level in tap samples taken pursuant to 567—paragraph 41.4(1) "c"(4)"2" after installing corrosion control or source water treatment (whichever sampling occurs later) shall replace lead service lines in accordance with the requirements of this subrule. If a system is in violation of 43.7(1) and 43.7(3) for failure to install source water or corrosion control treatment, the department may require the system to commence lead service line replacement under this subrule after the date by which the system was required to conduct monitoring under 567—paragraph 41.4(1) "c"(4)"2" has passed.

b. Lead service line replacement schedule. A public water supply system shall replace annually at least 7 percent of the initial number of lead service lines in its distribution system. The initial number of lead service lines is the number of lead lines in place at the time the replacement program begins. The system shall identify the initial number of lead service lines in its distribution system based upon a materials evaluation, including the evaluation required under 567—paragraph 41.4(1) "c"(1). The first year of lead service line replacement shall begin on the date the action level was exceeded in tap sampling referenced in 43.7(4) "a."

c. *Exemption.* A public water supply system is not required to replace an individual lead service line if the lead concentration in all service line samples from that line, taken pursuant to 567—paragraph 41.4(1) “c”(2)“3,” is less than or equal to 0.015 mg/L.

d. *Lead service line control.* A public water supply system shall replace the entire service line (up to the building inlet) unless it demonstrates to the satisfaction of the department under 43.7(4) “e” that it controls less than the entire service line. In such cases, the system shall replace the portion of the line which the department determines is under the system’s control. The system shall notify the user served by the line that the system will replace the portion of the service line under its control and shall offer to replace the building owner’s portion of the line, but is not required to bear the cost of replacing the building owner’s portion of the line. For buildings where only a portion of the lead service line is replaced, the water system shall inform the resident(s) that the system will collect a first flush tap water sample after partial replacement of the service line is completed if the resident(s) so desires. In cases where the resident(s) accepts the offer, the system shall collect the sample and report the results to the resident(s) within 14 days following partial lead service line replacement.

e. *Lead service line control—department review.* A public water supply system is presumed to control the entire lead service line (up to the building inlet) unless the system demonstrates to the satisfaction of the department in a letter submitted under 567—paragraph 42.4(2) “e”(4) that it does not have any of the following forms of control over the entire line (as defined by state statutes, municipal ordinances, public service contracts or other applicable legal authority): authority to set standards for construction, repair, or maintenance of the line, authority to replace, repair, or maintain the service line, or ownership of the service line. The department will review the information supplied by the system and determine whether the system controls less than the entire service line and, in such cases, will determine the extent of the system’s control. The determination will be in writing and it must explain the basis underlying the decision.

f. *Lead service line replacement schedule.* The department may require a public water supply system to replace lead service lines on a shorter schedule than that required by this subrule, taking into account the number of lead service lines in the system, where such a shorter replacement schedule is feasible. The department will make this determination in writing and notify the system of its finding within six months after the system is triggered into lead service line replacement based on monitoring referenced in 43.7(4) “a.”

g. *Cessation of lead service line replacement.* Any public water supply system may cease replacing lead service lines whenever first draw samples collected pursuant to 567—paragraph 41.4(1) “c”(2)“2” meet the lead action level during each of two consecutive monitoring periods and the system submits the results. If the first draw tap samples collected in any such water system thereafter exceed the lead action level, the system shall recommence replacing lead service lines, as detailed in 43.7(4) “b.”

h. *Reporting requirements.* To demonstrate compliance with 43.7(4) “a” through “d,” a system shall report the information specified in 567—paragraph 42.4(2) “e.”

567—43.8(455B) Viability assessment.

43.8(1) Definitions specific to viability assessment.

“*New system*” for viability assessment purposes includes public water supply systems which are newly constructed after the effective date of this rule, as well as systems which do not currently meet the definition of a PWS, but which expand their infrastructure and thereby grow to become a PWS. Systems not currently meeting the definition of a PWS and which add additional users and thereby become a PWS without constructing any additional infrastructure are not “new systems” for the purposes of this subrule.

“*Nonviable system*” for viability assessment purposes means a system lacking the technical, financial, and managerial ability to comply with 567—Chapters 40 through 43 and 81.

“*Significant noncompliance (SNC)*” for viability assessment purposes means the failure to comply with any drinking water standard as adopted by the state of Iowa as designated by the department.

“*Viability*” for viability assessment purposes is the ability to remain in compliance insofar as the requirements of the federal Safe Drinking Water Act and 567—Chapters 40 through 43 and 81.

“*Viable system*” for viability assessment purposes means a system with the technical, financial, and managerial ability to comply with applicable drinking water standards adopted by the state of Iowa.

43.8(2) *Applicability and purpose.* These rules apply to all new and existing public water supplies, including the following: new systems commencing operation after October 1, 1999; systems deemed to be in significant noncompliance with the primary drinking water standards; DWSRF applicants; and existing systems. The purpose of the viability assessment program is to ensure the safety of the public drinking water supplies and ensure the viability of new public water supply systems upon commencement of operation. The department may assess public notification requirements and administrative penalties to any public water supply system which fails to fulfill the requirements of this rule.

43.8(3) *Contents of a viability assessment.* The viability assessment must address the areas of technical, financial, and managerial viability for a public water supply system. The assessment must include evaluation of the following areas at a minimum, and the public water supply system may be required to include additional information as directed by the department. The viability of a system should be forecast for a 20-year period.

a. Technical viability.

- (1) Supply sources and facilities
- (2) Treatment
- (3) Infrastructure (examples: pumping, storage, distribution)

b. Financial viability.

- (1) Capital and operating costs
- (2) Revenue sources
- (3) Contingency plans

c. Managerial viability.

- (1) Operation
- (2) Maintenance
- (3) Management
- (4) Administration

43.8(4) *New systems.*

a. Submission of system viability assessment. New public water supply systems (including community, nontransient noncommunity systems, and transient noncommunity systems) commencing operation after the effective date of this rule are required to submit a completed system viability assessment for review by the department, prior to obtaining a construction permit. The viability assessment may be submitted with the application for a construction permit. The department may reject receipt or delay review of the construction plans and specifications until an adequate viability assessment is provided. If the department finds, upon review and approval of the viability assessment, that the PWS will be viable, a construction permit will be issued in accordance with 567—Chapters 40 and 43. Prior to beginning operation, a public water supply operation permit must be obtained in accordance with 43.2(455B) and 567—40.5(455B).

b. Review of the viability assessment. If the department declines to approve the viability assessment as submitted by the applicant, or if the department finds that the PWS is not viable, approval of construction and operation permit applications will be denied. If the viability assessment is conditionally approved, construction and operation permits will be issued, with conditions and a schedule to achieve compliance specified in the operation permit.

43.8(5) Existing systems.

a. Submission of system viability assessment. Any community, nontransient noncommunity, or transient noncommunity water system which operated prior to October 1, 1999, and was regulated as a public water system by the department shall be considered an existing system. Any system which does not currently meet the definition of a PWS, but which expands their infrastructure and thereby grows to become a PWS is considered a new system. Systems not currently meeting the definition of a PWS and which add additional users and thereby become a PWS without constructing any additional infrastructure are considered existing systems for the purposes of this subrule. All PWSs should complete a viability assessment. However, only those existing PWSs which meet one or more of the following criteria are required to complete a viability assessment for the department's review and approval.

- (1) Systems applying for DWSRF loan funds.
- (2) Systems categorized as being in significant noncompliance by the department, due to their history of failure to comply with drinking water standards.
- (3) Systems identified by the department via a sanitary survey as having technical, managerial, or financial problems as evidenced by such conditions as poor operational control, a poor state of repair or maintenance, vulnerability to contamination, or inability to maintain adequate distribution system operating pressures.
- (4) Systems which have been unable to retain a certified operator in accordance with 567—Chapter 81.

b. Review of viability assessments for systems required to submit an assessment. If the assessment is incomplete and does not include all of the required elements, the supply will be notified in writing and will be given an opportunity to modify and resubmit the assessment within the time period specified by the department. If the system fails to resubmit a completed viability assessment as specified by the department, the department may find that the system is not viable. If the submitted assessment is complete, the department will either indicate that the system is viable or not viable after the assessment review process. The system will be notified of the results of the evaluation by the department.

c. Review of voluntarily submitted viability assessments. It is recommended that all existing systems complete the viability assessment and submit it to the department. Voluntarily submitted assessments may be reviewed upon request and will be exempt from any requirements to modify the assessment if it is not approved, or from a determination that the system is not viable, providing the system does not meet any of the criteria for mandatory completion of a viability assessment as set forth in 43.8(4)“a” above.

43.8(6) Systems which are determined to be not viable.

a. Applicability. The following applies to community, nontransient noncommunity, and transient noncommunity systems:

- (1) Systems applying for DWSRF loan funds must be viable, or the loan funds must be used to assist the system in attaining viable status. If a system making a loan application is found to be not viable, and loan funds will not be sufficient or available to ensure viability, then the situation must be corrected to the department's satisfaction prior to qualification to apply for loan funds.
- (2) Systems which meet the department's criteria of significant noncompliance are not considered viable. The viability assessment completed by the public water supply and the most recent sanitary survey results will be evaluated by the department to assist the system in returning to and remaining in compliance, which would achieve viability. Required corrective actions will be specified in the system's operation permit and will include a compliance schedule. Field office inspections will be conducted on an as-needed basis to assist the system in implementing the required system improvements.
- (3) Systems experiencing technical, managerial, or financial problems as noted by department in the sanitary survey will be considered not viable. The viability assessment completed by the public water supply will be evaluated by the department to assist the system in attaining viability, and any required corrective actions will be specified in the system's operation permit.

(4) Systems unable to retain a certified operator will be considered not viable. All community and nontransient noncommunity water systems, and transient noncommunity water systems as denoted by the department, are required to have a certified operator who meets the requirements of 567—Chapter 81. The viability assessment completed by the public water supply will be used to determine the source of the problem, and required corrective actions will be specified in the system's operation permit.

b. Reserved.

43.8(7) *Revocation or denial of operation or construction permit.*

a. Revocation or denial of an operation permit. Failure to correct the deficiencies regarding viability, as identified in accordance with a compliance schedule set by the department, may result in revocation or denial of the system's operation permit. If the department revokes or denies the operation permit, the owner of the system must negotiate an alternative arrangement with the department for providing treatment or water supply services within 30 days of receipt of the notification by the department unless the owner of the supply appeals the decision to the department. The public water supply is required to provide water that continually meets all health-based standards during the appeal process.

b. Denial of new construction permits for an existing system. In addition to the criteria provided in 567—Chapters 40 through 44, new construction permits for water system improvements may be denied until the system makes the required corrections and attains viable status unless the proposed project is necessary to attain viability.

c. Failure to conform to approved construction plans and specifications, or to comply with the requirements of 567—Chapters 40 to 44. Failure of a project to conform to approved construction plans and specifications, or failure to comply with the requirements of 567—Chapters 40 to 44, constitutes grounds for the director to withhold the applicable construction and operation permits. The system is then responsible for ensuring that the identified problem with the project is rectified so that permits may be issued. Once an agreement for correcting the problem is reached between the department and the system, the department will issue the appropriate permits according to the provisions of the agreement. If an agreement cannot be reached within a reasonable time period, the permit shall be denied.

d. Contents of the notification denying the permit. The notification of denial or withholding approval of the operation or construction permit will state the department's reasons for withholding or denying permit approval.

43.8(8) *Appeals.*

a. Request for formal review of determination of viability. A person or entity who disagrees with the decision regarding the viability of a public water supply system may request a formal review of the action. A request for review must be submitted in writing to the director by the owner or their designee within 30 days of the date of notification by the department of the viability decision.

b. Appeal of denial of operation or construction permit. A decision to deny an operation or construction permit may be appealed by the applicant to the environmental protection commission pursuant to 567—Chapter 7. The appeal must be made in writing to the director within 30 days of receiving the notice of denial by the owner of the public water supply.

567—43.9(455B) Enhanced filtration and disinfection requirements for surface water and IGW systems serving at least 10,000 people.

43.9(1) General requirements.

a. Applicability. The requirements of this rule constitute national primary drinking water regulations. This rule establishes the filtration and disinfection requirements that are in addition to criteria under which filtration and disinfection are required in 43.5(455B). The requirements of this rule are applicable, beginning January 1, 2002, to all public water systems using surface water or groundwater under the direct influence of surface water, in whole or in part, and which serve at least 10,000 people. This rule establishes or extends treatment technique requirements in lieu of maximum contaminant levels for the following contaminants: *Giardia lamblia*, viruses, heterotrophic plate count bacteria, *Legionella*, *Cryptosporidium*, and turbidity. Each surface water or groundwater under the direct influence of surface water system serving at least 10,000 people must provide treatment of its source water that complies with these treatment technique requirements and they are in addition to those identified in subrule 43.5(1). The treatment technique requirements consist of installing and properly operating water treatment processes that reliably achieve:

(1) At least 99 percent (2-log) removal of *Cryptosporidium* between a point where the raw water is not subject to recontamination by surface water runoff and a point downstream before or at the first customer for filtered systems.

(2) Compliance with the profiling and benchmark requirements under 43.9(2).

(3) The department may require other surface water or groundwater under the direct influence of surface water systems to comply with this rule, through an operation permit.

b. Compliance determination. A public water system subject to the requirements of this rule is considered to be in compliance with the requirements of 43.9(1) “a” if it meets the applicable filtration requirements in either 43.5(3) or 43.9(3) and the disinfection requirements in 43.5(2) and 43.6(2).

c. Prohibition of uncovered intermediate or finished water reservoirs new construction. Systems are not permitted to begin construction of uncovered intermediate or finished water storage facilities.

43.9(2) Disinfection profiling and benchmarking.

a. Determination of systems required to profile. A public water system subject to the requirements of this rule must determine its total trihalomethane (TTHM) and haloacetic acid (HAA5) annual averages using the procedures listed below. The annual average is the arithmetic average of the quarterly averages of four consecutive quarters of monitoring. Both the TTHM and HAA5 samples must be collected as paired samples during the same time period in order for each parameter to have the same annual average period for result comparison. A paired sample is one that is collected at the same location and time and is analyzed for both TTHM and HAA5 parameters.

(1) Allowance of information collection rule data. Those systems that collected data under the provisions of the federal Information Collection Rule listed in Code of Federal Regulations Title 40, Part 141, Subpart M, must use the results of the TTHM and HAA5 samples collected during the last four quarters of monitoring required under 40 CFR 141.142. The system must have submitted the results of the samples collected during the last 12 months of required monitoring.

(2) Systems that have not collected TTHM and HAA5 data under 43.9(2) “a”(1). Those systems that have not collected four consecutive quarters of paired TTHM and HAA5 samples as described under 43.9(2) “a”(1) must comply with all other provisions of this subrule as if the HAA5 monitoring had been conducted and the results of that monitoring required compliance with 43.9(2) “b.” The system that elects this option must notify the department in writing of its decision.

(3) The department may require that a system use a more representative annual data set than the data set determined under 567—subparagraph 42.9(2)“a”(1) for the purpose of determining applicability of the requirements of this subrule.

(4) Profiling determination criteria. Any system having either a TTHM annual average greater than 0.064 mg/L or an HAA5 annual average greater than 0.048 mg/L during the period identified in 43.9(2)“a”(1) through (3) must comply with 43.9(2)“b.”

b. Disinfection profiling.

(1) Applicability. Any system that meets the criteria in 43.9(2)“a”(4) must develop a disinfection profile of its disinfection practice for a period of up to three years.

(2) Monitoring requirements. The system must monitor daily for a period of 12 consecutive calendar months to determine the total logs of inactivation for each day of operation, based on the CT_{99.9} values in Tables 1 through 8 in Appendix A, as appropriate, through the entire treatment plant. This system must begin this monitoring as directed by the department. As a minimum, the system with a single point of disinfectant application prior to entrance to the distribution system must conduct the monitoring in 43.9(2)“b”(2)“1” through “4.” A system with more than one point of disinfectant application must conduct the monitoring in 43.9(2)“b”(2)“1” through “4” for each disinfection segment. The system must monitor the parameters necessary to determine the total inactivation ratio, using analytical methods in 43.5(4)“a” as follows:

1. The temperature of the disinfected water must be measured once per day at each residual disinfectant concentration sampling point during peak hourly flow.

2. If the system uses chlorine, the pH of the disinfected water must be measured once per day at each chlorine residual disinfectant concentration sampling point during peak hourly flow.

3. The disinfectant contact time(s) (“T”) must be determined for each day during peak hourly flow.

4. The residual disinfectant concentration(s) (“C”) of the water before or at the first customer and prior to each additional point of disinfection must be measured each day during peak hourly flow.

(3) Use of existing data. A system that has existing operational data may use those data to develop a disinfection profile for additional years, in addition to the disinfection profile generated under 43.9(2)“b”(2). Such systems may use these additional yearly disinfection profiles to develop a benchmark under the provisions of 43.9(2)“c.” The department must determine whether these operational data are substantially equivalent to data collected under the provisions of 43.9(2)“b”(2). These data must also be representative of inactivation through the entire treatment plant and not just of certain treatment segments.

(4) Calculation of the total inactivation ratio. The system must calculate the total inactivation ratio as follows, using the CT_{99.9} values from Tables 1 through 8 listed in Appendix A:

1. If the system uses only one point of disinfectant application, the system may determine the total inactivation ratio for the disinfection segment based on either of the following two methods:

- Determine one inactivation ratio (CT_{calc}/CT_{99.9}) before or at the first customer during peak hourly flow.

- Determine successive CT_{calc}/CT_{99.9} values, representing sequential inactivation ratios, between the point of disinfectant application and a point before or at the first customer during peak hourly flow. Under this alternative, the system must calculate the total inactivation ratio by determining (CT_{calc}/CT_{99.9}) for each sequence and then adding the (CT_{calc}/CT_{99.9}) values together to determine Σ(CT_{calc}/CT_{99.9}).

2. If the system uses more than one point of disinfectant application before the first customer, the system must determine the CT value of each disinfection segment immediately prior to the next point of disinfectant application, or for the final segment, before or at the first customer, during peak hourly flow. The CT_{calc}/CT_{99.9} value of each segment and Σ(CT_{calc}/CT_{99.9}) must be calculated using the method in 43.9(2)“b”(4)“1.”

3. The system must determine the total logs of inactivation by multiplying the value calculated in 43.9(2)“b”(4)“1” or “2” by 3.0.

(5) Systems using chloramines or ozone. A system that uses either chloramines or ozone for primary disinfection must also calculate the logs of inactivation for viruses using a method approved by the department.

(6) Profile retention requirements. The system must retain disinfection profile data in graphic form, as a spreadsheet, or in some other format acceptable to the department for review as part of sanitary surveys conducted by the department. The department may require the system to submit the data to the department directly or as part of a monthly operation report.

c. Disinfection benchmarking.

(1) Significant change to disinfection practice. Any system required to develop a disinfection profile under the provisions of 43.9(2)“a” or “b” that decides to make a significant change to its disinfection practice must obtain department approval prior to making such change. Significant changes to disinfection practice are:

1. Changes to the point of disinfection;
2. Changes to the disinfectant(s) used in the treatment plant;
3. Changes to the disinfection process; and
4. Any other modification identified by the department.

(2) Calculation of the disinfection benchmark. Any system that is modifying its disinfection practice must calculate its disinfection benchmark using the procedure specified below:

1. For each year of profiling data collected and calculated under 43.9(2)“b,” the system must determine the lowest average monthly *Giardia lamblia* inactivation in each year of profiling data. The system must determine the average *Giardia lamblia* inactivation for each calendar month for each year of profiling data by dividing the sum of daily *Giardia lamblia* inactivation by the number of values calculated for that month.

2. The disinfection benchmark is the lowest monthly average value (for systems with one year of profiling data) or average of lowest monthly average values (for systems with more than one year of profiling data) of the monthly logs of *Giardia lamblia* inactivation in each year of profiling data.

(3) A system that uses either chloramines or ozone for primary disinfection must also calculate the disinfection benchmark for viruses using a method approved by the department.

(4) The system must submit the following information to the department as part of its consultation process:

1. A description of the proposed change;
2. The disinfection profile for *Giardia lamblia* (and, if necessary, viruses) under 43.9(2)“b” and the disinfection benchmark as required by 43.9(2)“c”(2); and
3. An analysis of how the proposed change will affect the current levels of disinfection.

43.9(3) Filtration.

a. Conventional filtration treatment or direct filtration.

(1) Turbidity requirement in 95 percent of samples. For systems using conventional filtration or direct filtration, the turbidity level of representative samples of a system’s filtered water must be less than or equal to 0.3 NTU in at least 95 percent of the measurements taken each month, measured as specified in 43.5(4)“a”(1) and 43.5(4)“b”(1).

(2) Maximum turbidity level. The turbidity level of representative samples of a system’s filtered water must at no time exceed 1 NTU, measured as specified in 43.5(4)“a”(1) and 43.5(4)“b”(1).

(3) Systems with lime-softening treatment. A system that uses lime softening may acidify representative samples prior to analysis using a protocol approved by the department.

b. Filtration technologies other than conventional filtration treatment, direct filtration, slow sand filtration, or diatomaceous earth filtration. The department may allow a public water system to use a filtration technology not listed in 43.9(3) “a” or 43.5(3) “c” or “d” if it demonstrates to the department, using pilot plant studies or other means, that the alternative filtration technology, in combination with disinfection treatment that meets the requirements of 43.5(2), consistently achieves 99.9 percent removal or inactivation of *Giardia lamblia* cysts, 99.99 percent removal or inactivation of viruses, and 99 percent removal of *Cryptosporidium* oocysts and the department approves the use of the filtration technology. For each approval, the department will set turbidity performance requirements that the system must meet at least 95 percent of the time and the requirement that the system shall not exceed at any time at a level that consistently achieves 99.9 percent removal or inactivation of *Giardia lamblia* cysts, 99.99 percent removal or inactivation of viruses, and 99 percent removal of *Cryptosporidium* oocysts.

43.9(4) Filtration sampling requirements.

a. Monitoring requirements for systems using filtration treatment. In addition to monitoring required by 43.5(4), a public water system subject to the requirements of this rule that provides conventional filtration treatment or direct filtration must conduct continuous monitoring of turbidity for each individual filter using an approved method in 43.5(4) “a”(1) and must calibrate turbidimeters using the procedure specified by the manufacturer. Systems must record the results of individual filter monitoring every 15 minutes.

b. Failure of the continuous turbidity monitoring equipment. If there is a failure in the continuous turbidity monitoring equipment, the system must conduct grab sampling every four hours in lieu of continuous monitoring until the turbidimeter is repaired and back online. A system has a maximum of five working days after failure to repair the equipment, or else it is in violation.

43.9(5) Reporting and record-keeping requirements. In addition to the reporting and record-keeping requirements in 567—paragraph 42.4(3) “c,” a system subject to the requirements of this rule that provides conventional filtration treatment or direct filtration must report monthly to the department the information specified in 43.9(5) “a” and “b” beginning January 1, 2002. In addition to the reporting and record-keeping requirements in 567—paragraph 42.4(3) “c,” a system subject to the requirements of this rule that provides filtration approved under 43.9(3) “b” must report monthly to the department the information specified in 43.9(5) “a” beginning January 1, 2002. The reporting in 43.9(5) “a” is in lieu of the reporting specified in 567—subparagraph 42.4(3) “c”(1).

a. Turbidity. Turbidity measurements as required by 43.9(3) must be reported in a format acceptable to the department and within ten days after the end of each month that the system serves water to the public. Information that must be reported includes:

- (1) The total number of filtered water turbidity measurements taken during the month;
- (2) The number and percentage of filtered water turbidity measurements taken during the month which are less than or equal to the turbidity limits specified in 43.9(3) “a” or “b”; and
- (3) The date and value of any turbidity measurements taken during the month which exceed 1 NTU for systems using conventional filtration treatment or direct filtration or which exceed the maximum level set by the department under 43.9(3) “b.”

b. Individual filter turbidity monitoring. Systems must maintain the results of individual filter turbidity per monitoring taken under 43.9(4) for at least three years. Systems must report to the department that they have conducted individual filter turbidity monitoring under 43.9(4) within ten days after the end of each month that the system serves water to the public. Systems must report to the department individual filter turbidity measurement results taken under 43.9(4) within ten days after the end of each month that the system serves water to the public only if measurements demonstrate one or more of the conditions specified in 43.9(5) “b”(1) through (4). Systems that use lime softening may apply to the department for alternative exceedance levels for the levels specified in 43.9(5) “b”(1) through (4) if they can demonstrate that higher turbidity levels in individual filters are due to lime carryover only and not due to degraded filter performance.

(1) For any individual filter that has a measured turbidity level of greater than 1.0 NTU in two consecutive measurements taken 15 minutes apart, the system must report the filter number, the turbidity measurement, and the date(s) on which the exceedance occurred. In addition, the system must either produce a filter profile for the filter within seven days of the exceedance (if the system is not able to identify an obvious reason for the abnormal filter performance) and report that the profile has been produced or report the obvious reason for the exceedance.

(2) For any individual filter that has a measured turbidity level of greater than 0.5 NTU in two consecutive measurements taken 15 minutes apart at the end of the first four hours of continuous filter operation after the filter has been backwashed or otherwise taken offline, the system must report the filter number, the turbidity, and the date(s) on which the exceedance occurred. In addition, the system must either produce a filter profile for the filter within seven days of the exceedance (if the system is not able to identify an obvious reason for the abnormal filter performance) and report that the profile has been produced or report the obvious reason for the exceedance.

(3) For any individual filter that has a measured turbidity level of greater than 1.0 NTU in two consecutive measurements taken 15 minutes apart at any time in each month of three consecutive months, the system must report the filter number, the turbidity measurement, and the date(s) on which the exceedance occurred. In addition, the system must conduct a self-assessment of the filter within 14 days of the exceedance and report that the self-assessment was conducted. The self-assessment must consist of at least the following components: assessment of filter performance; development of a filter profile; identification and prioritization of factors limiting filter performance; assessment of the applicability of corrections; and preparation of a filter self-assessment report.

(4) For any individual filter that has a measured turbidity level of greater than 2.0 NTU in two consecutive measurements taken 15 minutes apart at any time in each month of two consecutive months, the system must report the filter number, the turbidity measurement, and the date(s) on which the exceedance occurred. In addition, the system must arrange for a comprehensive performance evaluation to be conducted by the department or a third party approved by the department no later than 30 days following the exceedance and have the evaluation completed and submitted to the department no later than 90 days following the exceedance.

c. Additional reporting requirement for turbidity combined filter effluent.

(1) If at any time the turbidity exceeds 1 NTU in representative samples of filtered water in a system using conventional filtration treatment or direct filtration, the system must inform the department as soon as possible, but no later than the end of the next business day.

(2) If at any time the turbidity in representative samples of filtered water exceeds the maximum level set by the department under 43.9(3) “b” for filtration technologies other than conventional filtration treatment, direct filtration, slow sand filtration, or diatomaceous earth filtration, the system must inform the department as soon as possible, but no later than the end of the next business day.